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LETTERS AND PAPERS

ON

Agriculture, Planting, &c.

ADDRESSED TO

The SOCIETY inſtituted at BATH,

FOR THE ENCOURAGEMENT OF

Agriculture, *Arts*, *Manufactures*, and *Commerce*,

Within the Counties of *Somerſet*, *Wilts*, *Gloceſter*, and
Dorſet, and the City and County of *Briſtol*.

VOLUME I.

LETTERS AND PAPERS

ON

Agriculture, Planting, &c.

SELECTED FROM

THE CORRESPONDENCE-BOOK OF

THE SOCIETY INSTITUTED AT BATH,

For the Encouragement of AGRICULTURE, ARTS,
MANUFACTURES, and COMMERCE,
Within the Counties of *Somerſet*, *Wilts*, *Gloceſter*, and *Dorſet*,
and the City and County of *Briſtol*.

TO WHICH IS ADDED,

AN APPENDIX;

CONTAINING,

A PROPOSAL FOR THE FURTHER IMPROVEMENT OF AGRICULTURE,

BY A MEMBER OF THE SOCIETY.

AND

THE TRANSLATION OF A
LETTER from DR. TISSOT to MONS. HIRZEL,
in Anſwer to MONS. LINGUET's TREATISE on
BREAD-CORN and BREAD.

BY ANOTHER MEMBER OF THE SOCIETY.

VOL. I.

THE SECOND EDITION.

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PREFACE.

THAT the Public may with greater clearneſs apprehend the ſcope of the preſent work, it is thought neceſſary to prefix the following ſhort account of the nature and the occaſion of its publication.

In the Autumn ſeaſon of the year 1777, ſeveral Gentlemen met at the City of BATH, and formed a Society for the encouragement of Agriculture, Arts, Manufactures, and Commerce, in the Counties of SOMERSET, WILTS, GLOCESTER, and DORSET, and in the City and County of BRISTOL.

This ſcheme received immediate approbation and great encouragement, not only by liberal ſubſcriptions, but alſo by many uſeful communications of knowledge, both ſcientific and practical, from ingenious and ſenſible correſpondents.

On application to the London and Provincial Societies in this kingdom, inſtituted for the like purpoſes, they very politely offered their aſſiſtance in communicating what might be generally uſeful; and to ſome of them we are indebted for much intereſting intelligence.

As the diffuſion of uſeful information in general is one end propoſed by this inſtitution, the Society think they cannot fulfil this intention in a more effectual manner, than by the publication of ſuch papers as appear to contain what is moſt likely to be of public utility. Indeed, this is the only method by which the various improvements, and practical information, ſuggeſted to them, can be generally diſperſed, even among thoſe whom, from the nature of their inſtitution, they are under particular obligations to ſerve.

In ſelecting the following papers, regard has been principally had to ſuch as relate to matters of practice. Uſeful hints, however, of the ſpeculative kind, which may in their conſequences lead to practical improvements, have not been neglected;—ſuch will always be eſteemed valuable communications, although inferior to thoſe that have already been ſubmitted to the teſt of experiment.

In a work of this kind, to be explicit and intelligible, are all the requiſites with reſpect to language; and, therefore, the thoughts of our correſpondents are generally given in their own words.

The Society, however, think it neceſſary here to obſerve, that although they have no cauſe to diſtruſt the knowledge or veracity of any perſon who has favoured them with his correſpondence, yet, for obvious reaſons, they do not mean, as a body, to vouch for the truth of any relation, or to give authority to any opinion contained in the following papers, further than the *notes* expreſs, and to recommend them as ſubjects of enquiry and examination.

To many ingenious correſpondents, the Society take this opportunity of acknowledging their obligations, and of reſpectfully requeſting ſuch further information, both from them and others, as relates to any of the intereſting ſubjects to which their attention is directed.

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LETTERS

TO THE

BATH AGRICULTURE SOCIETY.

ARTICLE I.

On the Riſe, Progreſs, and Mode of SETTING *Wheat in Norfolk.*

[By a Gentleman near Norwich.]

GENTLEMEN,

IT is with much pleaſure that I now anſwer your enquiries relative to the practice of Setting Wheat in this county. It is, in my opinion, one of the greateſt improvements in Huſbandry that hath taken place this century; and, were it generally adopted throughout the kingdom, would be attended with very great advantages to the publick.

The Setting of Wheat ſeems to have been firſt ſuggeſted by planting grains in a garden from mere curioſity, by perſons who had no thought or opportunity of extending it to a lucrative purpoſe; and I do not remember its being attempted on a larger ſcale, till a little Farmer near Norwich began it about twelve years ſince, upon leſs than an acre of land. For two or three years only a few followed his example; and theſe were generally the butt of their neighbours' merriment for adopting ſo ſingular a practice. They had, however, conſiderably better corn and larger crops than their neighbours: this, together with the ſaving in ſeed, engaged more to follow them; while ſome ingenious perſons, obſerving its great advantage, recommended, and publiſhed its utility in the Norwich papers. Theſe recommendations had their effect. The curioſity and enquiry of the Norfolk Farmers (particularly round Norwich) were excited, and they found ſufficient reaſon to make general experiments. Among the reſt was one of the largeſt occupiers of lands in this county, who ſet fifty-ſeven acres in one year. His ſucceſs, from the viſible ſuperiority of his crop, both in quantity and quality, was ſo great, that the following autumn he ſet three hundred acres, and has continued the practice ever ſince.

This noble experiment eſtabliſhed the practice, and was the means of introducing it generally among the intelligent Farmers in a very large diſtrict of land; there being few who now *ſow* any Wheat, if they can procure hands to *ſet* it. It has been generally obſerved, that although the *ſet* crops appear very thin during the autumn and winter, the plants tiller and ſpread prodigiouſly in the ſpring. The ears are indiſputably larger, without any dwarfiſh or ſmall corn; the grain is of a larger bulk, and ſpecifically heavier per buſhel, than when ſown.

The lands on which this method is particularly proſperous are, either after a clover ſtubble, or on which trefoil and graſs-ſeed were ſown the ſpring before the laſt, and on which cattle have been from time to time paſtured during the ſummer.*

Theſe grounds, after the uſual manuring, are once turned over by the plough in an extended flag, or turf, at ten inches wide; along which a man, who is called a *dibler*, with two ſetting-irons, ſomewhat bigger than ram-rods, but conſiderably bigger at the lower end, and pointed at the extremity, ſteps backwards along the turf and makes the holes about four inches aſunder every way, and an inch deep. Into theſe holes the droppers (women, boys, and girls) drop two grains, which is quite ſufficient. After this, a gate, buſhed with thorns, is drawn by one horſe over the land, and cloſes up the holes. By this mode, three pecks of grain is ſufficient for an acre; and being immediately buried, it is equally removed from vermin, or the power of froſt. The regularity of its riſing gives the beſt opportunity of keeping it clear from weeds, by weeding or hand-hoeing.

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* We cannot approve the cuſtom of feeding clover previous to its being planted with wheat, as preferable to mowing the graſs.

In a word, this practice is replete with greater utility than any that has been made in the agricultural art.

In a parochial view, it merits the higheſt attention, as it tends greatly to leſſen the rates, by employing the aged and children, at a ſeaſon too when they have little elſe to do.

It ſaves to the Farmer, and to the public, ſix pecks of Seed Wheat in every acre, which, if nationally adopted, (without conſidering the ſuperior

rior produce) would afford bread for more than half a million of people.*

The expence of ſetting by hand is now reduced to about ſix ſhillings an acre, and a very complete Drill-Plough† has lately been introduced among us, and found to anſwer extremely well, on ſummer fallows, by which the difficulty of getting hands is obviated, and the expence leſſened, as with this plough one man can ſet an acre per day. The maker is Mr. *James Blancher*, of Attleborough in Norfolk.

I am, &c.

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* This is a conſideration of the utmoſt conſequence, eſpecially when Wheat is dear. We are ſenſible of the utility of this method, and warmly recommend its being generally adopted in the Weſtern Counties.

† There is one of theſe Drill-Ploughs at the Society's Rooms, with ſome new improvements made by the inventor ſince the above letter was written. It has been tried by the Agricultural Committee in a field, and found to deliver the grain with great exactneſs and regularity, to the ſatisfaction of the Gentlemen and Farmers who attended the experiment. Any perſon diſpoſed to have one, may be furniſhed with it, by applying to the Secretary, price five guineas and a half, and carriage.

ARTICLE II.

On SETTING WHEAT.

[By a Gentleman Farmer in Norfolk.]

GENTLEMEN,

THE practice of ſetting Wheat in the eaſtern part of Norfolk is pretty general. The ſkill and labour required in performing it are ſo little, that it is done in many places by women and children only; in conſequence of which there are few places ſo thinly inhabited, but the Farmer may obtain hands ſufficient to do it upon the largeſt ſcale; and the expence is now reduced to eight ſhillings per acre on the average.* Each dibbler, employing three droppers, will ſet half an acre a day, making eight holes† in the length of every foot of the flag, whereby two dibblers with ſix droppers will find full employment for one plough, which, however, is not very material, as there will be no loſs of time on that account, for the land may be all ploughed and ſet as ſoon as convenient. The advantages attending this practice are, the ſaving of a conſiderable quantity of ſeed, ſix pecks per acre at leaſt—obtaining cleaner and better corn—providing a very lucrative employment for many of the poor, who would at that ſeaſon have little to do—and gaining a greater produce. The laſt-mentioned benefit, however, I aſſert on no better ground than that of two experiments only, but theſe were conducted with ſo much care as to be nearly deciſive.

---

* It is now done for 6*s*. per acre very well, nearly an acre being done in a day in ſome places.

† Six are ſufficient.

Theſe trials were made in the years 1774 and 1775, in the following manner:——

About Michaelmas 1774, a field of clover and ray-graſs ſtubble, containing twelve acres, was broken up and ploughed into broad ſtetches,* (the land being ſound and dry) which ſtetches were alternately ſet and ſown throughout the whole field, and the corn, after reaping, was laid and carefully kept ſeparate. On threſhing, it was found that the Wheat which had been ſet produced two buſhels per acre more than that ſown.

About Michaelmas 1775, the like experiment was tried in a field of eight acres, which was a clean clover ſtubble, treated in all reſpects as the former. The reſult was, that the produce of the Set Wheat exceeded that of the Sown Wheat one buſhel per acre.

---

* Diviſions by furrows.

In both trials, the corn of the Set Wheat exceeded that of the Sown in quality. It was more equal, and proved by far the beſt; ſo that, independent of the advantage accruing to the Farmer from ſupporting the poor by *employment*, (the beſt mode of ſupporting them) inſtead of aſſiſting them from the pariſh fund, (perhaps the worſt) you will ſee, as I ſhall now ſtate the account, that there is ſufficient inducement from the immediate profit for him to attempt and perſiſt in this practice.

	£.	s.	d.
Profit by ſeed ſaved on ſix acres, being nine buſhels, at 5s. per buſhel, ——	2	5	0
Ditto by increaſe of produce,—ſay ſix pecks per acre on an average,—nine buſhels	2	5	0
	4	10	0
Expence of ſetting ſix acres, 8s. per acre,	2	8	0
Net profit, £.	2	2	0

which is ſeven ſhillings per acre. But there are other advantages that I have not yet mentioned. A very great one I experienced laſt year, when from the heavy rains which fell in the ſummer, all my ſown wheat was more or leſs laid, none of my ſet wheat was at all ſo, by which I ſuffered leſs loſs in reaping the latter than the former, and the corn was much ſuperior in quality.

It has been found, that on ray-graſs ſtubbles, or lands foul with twitch-graſs or other weeds, the corn being ſet on the *middle*,* inſtead of running (as it does by ſowing) into the ſpace between the *edges* of the flag, comes up free from the impediments of graſs and other trumpery which uſually environ it in the other method; and to this circumſtance it is perhaps owing that, in the two experiments I have related above, the produce on the clover and ray-graſs ſtubble exceeded that of the clean clover ſtubble one buſhel per acre.—Hence ſetting Wheat ſeems peculiarly advantageous to graſſy and foul lands;—a lucky circumſtance, as the number of ſlovenly Farmers ſo greatly exceed that of the neat ones.

I hope what I have ſaid on this ſubject will be ſufficient to ſet the matter in its true light. I am ſure it appears ſo to me; for as I wiſh not to ſupport ſyſtems, I have felt no prejudices in favour of any merely as ſuch. You are therefore, welcome to make any uſe you pleaſe of this letter, concealing only my name, as, from the hurry in which it is written, I am afraid it may contain many inaccuracies.

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* This is an excellent remark, and ſtrictly juſt, although we apprehend ſeldom attended to by thoſe who, either from prejudice againſt this improvement, or from never being eye-witneſſes of the great advantages ariſing from the practice, have haſtily and inconſiderately cenſured it :——

Though we apprehend few good farmers would ſow lands which are foul with couch or twitch; and as to the annual weeds, the produce of all lands, they can do no harm at wheat ſeed time.

I am, &c.

March 5th, 1778.

ARTICLE III.

Anſwer to Queries reſpecting SET WHEAT.

[By a Gentleman Farmer in Norfolk.]

GENTLEMEN,

I AM much honoured by the approbation which the information contained in my laſt letter* met with from your Society; and in compliance with your wiſhes, ſhall moſt readily anſwer the queries ſent me by your Secretary, relative to the experiments I therein mentioned.

---

* See preceding Letter.

Query 1ſt. What kind of ſoil was the Wheat ſet in, and what the annual value of the land?

Anſw. The ſoil was light, inclining to ſand—worth fifteen ſhillings an acre, being within five miles of Norwich.

Q. 2d. How long had the land been in clover and ray-graſs before it was broken up and ſet with Wheat?

A. One year only: in this part of the country we ſeldom ſuffer clover alone to remain longer; the natural graſs after that time getting ſo much poſſeſſion of the ground as to render the ſecond year's crop of clover of little value.

Q. 3d. How deep were the holes dibbled, and at what diſtance were the rows from each other?

A. The holes were dibbled about an inch deep, and the rows were two on a flag, near four inches from each other.

Q. 4th. How many grains were dropped in a hole, and was the crop hoed?

A. Two grains were intended to be dropped, but this is often uncertain, from the unſkilfulneſs or careleſſneſs of the children who drop the corn. This crop was not hoed, which, although an excellent practice and much uſed here when wheat is ſown broad-caſt, does not appear ſo neceſſary when it is ſet.

Q. *5th.* How many buſhels per acre was the produce of the two fields?

A. The experiment having been made with a view only to aſcertain the proportional produce of the two methods, although that reſult was regiſtered, I find, on a freſh enquiry, that the total produce is forgotten. The common average growth of Wheat on the farm was about twenty-four buſhels per acre.

Q. *6th.* Was the ſtraw of the ſet wheat higher and ſtouter than that of the ſown?

A. The ſtraw of my ſet wheat has always been ſtronger, and higher; and being clearer from weeds, and of more equal ſize and ſtrength, is more eaſily reaped.

Q. *7th.* Do

Q. 7th. Do the Norfolk millers prefer the ſet to the ſown wheat; and is it more bulky in the kernel, or whiter in the flour, or both?

A. Thoſe of whom I have aſked the queſtion prefer the ſet wheat to the ſown. In general it is the moſt even ſample, having leſs ſmall corn intermixed with it, otherwiſe nearly the ſame ſize as the ſown wheat. I have not heard it generally obſerved that the flour is whiter.

Q. 8th. On what kind of land does the ſetting of wheat anſwer beſt upon the whole?

A. This has not yet been fully aſcertained: I am, however, inclined to think that the produce of the ſet wheat would be greater in proportion to that of the ſown, on all ray-graſs lands, or ſuch as are foul with twitch-graſs or other weeds. I mean that the difference would be greater than on any other cleaner lands; and this ſeems confirmed by the reſult of the two experiments mentioned in my laſt letter. Where the land is ſo ſtiff and wet that it cannot be readily covered by the buſhes drawn over it for that purpoſe, I apprehend the corn would be better ſown broad-caſt.

March 29, 1778.

On

ARTICLE IV.

On SETTING *Wheat, as for ſome years paſt practiſed in Norfolk and Suffolk.*

[By a Gentleman Farmer in Suffolk.]

GENTLEMEN,

THE deſire of being uſeful to ſociety leads me to communicate to you the following account of a new practice in agriculture, which is become general in Norfolk, and gaining ground faſt in this county.

In October, the lands which have produced broad clover or artificial graſſes, and ſometimes old paſture the foregoing ſummer, are ploughed up; taking care to lay the furrows as even as poſſible. A heavy roller is then paſſed over it; and a man, or ſeveral men, each with a pair of inſtruments called dibbles,* walk backward, making two rows of holes on the earth or flag turned out of each furrow, ſo that the holes are three inches diſtant in the rows, and the rows on each flag or line of turf near five inches from each other. One pair of dibbles employs four women or children, who follow the man, and drop two grains into each hole. After this, a hurdle, covered with buſhes, is drawn by a horſe acroſs the field till the wheat is covered, and the holes are filled up. In this method, the ſeed is regularly placed in the ground, four pecks† being ſufficient for an acre, whereas ten pecks are uſually ſown broad-caſt.

---

* Short ſticks with handles like a ſpade, and pointed in the form of a ſugar loaf, with a croſs pin near the point, to prevent the holes being made too deep.

An experiment was lately made in Norfolk, and the following particulars laid before their Agriculture Society:—

" A whole field was *ſown* and *ſet*, in alternate ſtetches. The ſown wheat was cut, carried, and threſhed ſeparate from that which was ſet. The produce of the *ſet* part was eight‡ buſhels per acre more than the *ſown*; and declared to be ſixpence per buſhel better."

---

† Three pecks have been found quite ſufficient.

‡ The difference of eight buſhels per acre is ſo great, that we were inclined to think there muſt have been ſome error in tranſcribing the experiment; and accordingly wrote to the Gentleman who favoured us with the account. He has ſince informed us, that on repeated

I myſelf have this year *ſet* twenty-three acres, nine of which are old graſs-land, ploughed this ſeaſon for the firſt time; ſeven acres are a lay of ſeven years; and the remaining ſeven have been in graſs only two years. The whole work (viz. ploughing, rolling, ſetting, and harrowing) was performed in ſeventeen days, by three ploughs, having a pair of horſes and one man to each plough, five men dibbling, and twenty children dropping; the roll and buſh harrow employed another man. The land was as follows: The firſt field a black mooriſh ſoil, with a clay under it—this, with us, is called a wood-cock ſoil. The next ſeven acres (a hill) were on the top a ſtrong clay, and the lower part a mixed ſoil. The laſt ſeven acres, a light rich land.

We plough very ſtrong land with a pair of horſes a-breaſt, and one man holds the plough, and guides the horſes with rope-reins.

enquiry of the parties who ſet, reaped, and threſhed the corn, he is aſſured it was matter of fact, and has not any reaſon to doubt the veracity of thoſe who related it. It was, however, a ſingular inſtance, for which we cannot account, otherwiſe than by ſuggeſting that the corn on the ſtetches ſown broad-caſt, being when ſown left *uncovered*, might be a great part of it devoured by birds and other vermin before it was harrowed in.

For one acre in the Norfolk experiment,

	£.	s.	d.
Seed ſaved 5 pecks, at 6s. per buſhel, —	0	7	6
Superior produce 8 buſhels, 5s. per buſhel,	2	0	0
Superior value to that ſown 6d. per buſhel,	0	4	0
	2	11	6
Expence of ſetting, —	0	10	6
Balance in favour of ſetting,	2	1	0

So that the farmer by this method gains the above balance, benefits ſociety nine buſhels and one peck, and at the ſame time feeds twenty-five extra mouths.——What a ſatisfaction to a benevolent mind!

When wheat is very full of weeds, it is cuſtomary with neat farmers to hoe it by hand when either ſet or ſown, and they gain more by it than the 7s. 6d. per acre paid for the labour.

Fallows, or ſummer-lays (as we call them) on heavy land, are conſtantly either ſown with turnips, or planted with cabbages. The turnips are drawn, and the cabbages are cut, and carried to an incloſure, either at the barn-door or at the corner of the field, made with buſh faggots, and well littered with ſtraw or haulm; and I am certain that ninety acres, one-third or perhaps half ploughed, will maintain, by means of turnips and artificicial graſſes, at leaſt as many cattle as the whole would in graſs.

Cabbages make bad-taſted butter, but are excellent for fattening cattle, having an aſtringent quality ſo oppoſite to that of the turnip, that ſix weeks are ſaved in the fattening a beaſt; in which inſtance not only the ſaving of time, but of feed alſo, is of no inconſiderable conſequence to the farmer.

The ſort principally raiſed is the tallow-loaf, or drum-head cabbage, but it being too tender to bear ſharp froſt, I planted ſome of this ſort and the common purple cabbage uſed for pickling (it being the hardeſt I know of) alternately, and when the ſeed-pods were perfectly formed, I cut down the purple, and left the other for ſeed. This had the deſired effect, and produced a mixt ſtock, of a deep-green colour with purple veins, retaining the ſize of the drum-head, and acquiring the hardneſs of the purple.

We have tried the Scotch cabbage, but found them ſo ſlow in their growth, that they would not anſwer unleſs ſown in autumn, and planted in beds, the expence of which would deſtroy the profit.*

It is to be remarked, that froſts and cold winds, in this eaſtern part of the kingdom, prevent our ſowing till the end of February always, and often till ſome time in March; and the ſort I have mentioned do very well at that time, requiring only to be taken out of the ſeed-bed and planted in the field at eighteen inches diſtance every way.†

Turnips are always twice, and often three times hand-hoed with a nine-inch hoe;—this work requires conſiderable dexterity, as the plants that are not to be cut up ſhould be left regularly at a foot diſtance from each other, and the hoeing muſt be begun before the plants are too forward. A farmer who is not uſed to this practice, and ſees the withered plants the day after hoeing, will be frightened, and think his whole crop is deſtroyed, as I have experienced, but without any reaſon; for by this proceſs they will come to 12, and even 18 or 20 pounds weight without their leaves. But in order to have them of this weight, the manure muſt be different from any thing I have ſeen in the weſt of England; and, perhaps, to render turnips as valuable there as they are with us, agriculture muſt be brought to the ſame degree of perfection as it is in Norfolk, Hertfordſhire, ſome parts of Eſſex, and this county. The price of hoeing is 4s. 6d. the firſt time, 2s. 6d. the ſecond, and 2s. the third, when a third hoeing is neceſſary.

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* We beg leave here to obſerve, that ſowing the ſeed on a wheat ſtubble, ploughed up, would do no detriment; on the contrary, it would prepare the land for a ſpring turn and ſummer tilth for turnips; and whether the ſeed be ſown ſpring or autumn, tranſplanting and hoeing will be equally neceſſary. Wheat ſown in autumn is no more trouble than in ſpring. But we find that Scotch cabbages, ſown in April, come to their higheſt perfection both in ſize and quality in the county of Somerſet.

† Surely the plants muſt be hoed; and the ſame proceſs only is required in the Scotch as other kinds.

I am, &c.

Suffolk.

ARTICLE V.

A brief Account of the Norfolk Huſbandry.

[By a Gentleman near Norwich.]

GENTLEMEN,

IN anſwer to your enquiries reſpecting the improvements in huſbandry made in this county, be pleaſed to accept the following account.

About ſixty years ſince, a great part of this county was ſheep-walks, rented only at about eighteen pence an acre; and even within my memory, many thouſand acres were in this ſtate, which now are turned into the fineſt farms, and let at twenty ſhillings per acre.

The late amazing improvements may be attributed to various cauſes. Among others, the following have not been the leaſt operative.

Firſt; Incloſing our heath and waſte lands; folding ſheep; and the moſt extenſive uſe of marle and clay, on ſandy ſoils eſpecially.

2dly; By the general introduction of turnips, well hand-hoed; of clover, ray-graſs, and buck wheat, and an excellent courſe of crops.

The farms being generally large, and held on long leaſes, the tenants were thereby enabled to lay out their money freely in improvements without being in danger of loſing the advantages ariſing from their coſt and labour.

We poſſeſs one natural advantage, which, perhaps, cannot be found in an equal degree in many other counties. In all our ſandy lands, wherever we dig, we find excellent white and yellow marle, or clay. The goodneſs of the marle is determined by its ſubſiding quick in water. On the firſt diſcovery of marle, our farmers ſpread it in larger quantities than at preſent; few laid on leſs than eighty loads per acre; but for near thirty years paſt, the general quantity has been from forty to fifty loads (or tons) per acre. The effects of this quantity will laſt twenty years; and then half as much more added will reſtore fertility to the ſoil. We have however found, that, on lands wholly ſandy, clay has had a better effect than marle; but where the ſoil is a mixture of ſand and loam, or of ſand and gravel, marle does excellently. It is not, however, to marle and clay only, that our improvements are owing.—Our ſheep are folded both ſummer and winter. We fatten beaſts during the winter on turnips in our farm-yards, in which we alſo keep a large ſtock of ſwine. Our ſtubbles are cut, and, with large quantities of ſtraw, converted into manure. Oil cake is alſo laid on wheat lands to the amount of two guineas per acre. Theſe manures, freely uſed, have proved the ſources of wealth to thouſands.

The uſual courſe of crops among our greateſt and beſt farmers is, 1. Turnips; 2. Barley; 3. Clover, or clover and ray-graſs; 4. Wheat. This courſe has of late years become very general, and keeps the ſoil clean. We manure for turnips if poſſible, and alſo for wheat. Sometimes our clover is extended to three years, but not frequently. Of late, eſpecially, our clover often fails the third year, and ſometimes the ſecond, if the land be wet; for wherever the water ſtands in the winter or ſpring, the clover turns black and decays. Our farmers agree in the opinion, that if turnips are ſown on a well-conditioned fallow, and twice hoed, and the land ploughed three times for barley, the clover may remain at leaſt two years without giving a foul crop of wheat, eſpecially as our wheats, on clover lays, are of late almoſt wholly *ſet*, and more eaſily kept clean than when ſown broad-caſt. We ſet from two to three pecks per acre, and find great advantage from the practice—the expence of ſetting by hand is, from ſix to eight ſhillings per acre. On our fallows, we plant with Mr. Blancher's drill-plough, at leſs than half the expence, and with equal regularity and ſucceſs.

The Norfolk Huſbandry is, as Mr. Young has juſtly obſerved, quite a ſyſtem, every ſucceſſive part of which is dependent on the foregoing, and therefore it will not admit of much variation.

As every thing depends on the ſucceſs of turnips, *their* ſucceſs depends on good hoeing. They are the only fallow in our uſual courſe: nor can we change them for a *mere* fallow, becauſe the ſheep kept to fold, and to feed off the clover and ray-graſs, would then ſtarve. We give four ploughings for turnips, and hoe them well twice. They often, with this culture, prove worth five guineas an acre. The principal part of the crop is drawn and carried into farm-yards for fattening beaſts; the remainder we feed off with ſheep and lambs, which clear the land of every part of them.

We generally mow the firſt and ſecond growth of clover; not merely on account of the hay, but becauſe by repeated experience we are convinced the wheat which follows is far better than it would be after feeding.

Soapers' aſhes are laid on ſtrong wet lands with great ſucceſs; and alſo on paſtures as a top-dreſſing in the beginning of April.

Malt-duſt and ſoot are uſed on meadows, and anſwer well; the latter is purchaſed at high prices from Norwich.

The winter food of cows is chiefly turnips and ſtraw, in the farm-yards, which are kept well littered with chopped ſtubble and ſtraw.

We reckon ſix horſes neceſſary for one hundred acres of arable; and with two in a plough we till two acres in a day, five or ſix inches deep. Stubbles for fallow are ploughed in during autumn—this alſo deſtroys the weeds.

A good dairy-maid with us will take proper care of twenty cows; and to every cow our beſt farmers keep one hog.

The common mode of eſtimating the expence of taking a farm is, that three rents will about ſtock it, or four very compleatly.

In ſome parts of this county conſiderable quantities of cole-ſeed are raiſed; we hand-hoe it like turnips, and by that means nearly double the value of the crop.*

Our broad clover ſometimes produces near three tons the firſt cutting per acre. Nonſuch, ray-graſs, and ſmall white clover, are an excellent mixture to lay down dry lands with; and yield the ſweeteſt hay.

Near the coaſt great quantities of ſea-weed, or ooze, are collected, and uſed as manure to good purpoſe. We mix it in compoſt with earth and lime, or marle and dung, for one year, and then lay it on arable land. Our beſt farmers beat down thiſtles and nettles, and mow the weeds in their borders, ditches, and the adjoining roads, lanes, and commons, before they ſeed, and burn them to aſhes; the aſhes are uſed as a top-dreſſing for their meadow-lands.

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* An Eſſex Gentleman informs us, that he ſows cole-ſeed in drills, one foot or fourteen inches apart; and that by this method the largeſt quantity, and the beſt ſeed, are produced.

This is excellent management, and worthy of general imitation; for it ſaves infinite labour the ſucceeding ſpring in the fields adjoining.

Moſt of the farmers round Norwich carry dung to the diſtance of ten or twelve miles. They load a waggon for two ſhillings, or a cart with three horſes for one ſhilling.

A great deal of buck-wheat is ſown here as a preparation for wheat, and anſwers well. Six pecks are ſown per acre, and the average produce is from three to four quarters. The price is generally the ſame as that of barley, and it is an excellent fattening for ſwine and poultry.

Many of our farmers have cultivated lucerne with ſucceſs on good rich lands. On a poor ſoil it ſeldom anſwers well.

Two-wheeled ploughs are uſed in general, as being moſt eaſy and expeditious; but in heavy lands they uſe ſwing-ploughs, and two horſes always do the work. We ſhould ſmile at the folly of putting four horſes to a plough in *any ſoil*, becauſe we know it to be unneceſſary, except where the land abounds with ſtone.

I am, &c.

The preceding Letter abounds with a great deal of good information, and is written by one who ſeems thoroughly to underſtand what he writes about.

ARTICLE VI.

On the Culture of POTATOES.

[By the Rev. Mr. HIGSON, Vicar of Bath-Eaſton.]

GENTLEMEN,

HAVING had many years' experience in cultivating Potatoes, I take the liberty of ſending a few obſervations thereon, which are much at your ſervice.

Potatoes flouriſh moſt in a dry ſandy loam. The ground ſhould be well manured with rotten horſe-dung; and the ſeed changed every year. The Cheſhire or Lancaſhire kinds anſwer beſt in the neighbourhood of Bath. Warminſter or Farringdon potatoes are alſo a good change for this ſoil. Thoſe from Monmouth and the adjacent parts are not ſo good.

They ſhould be planted in freſh ground every year. If either freſh or the ſame ſeed be planted upon the ſame ſoil for two or three years ſucceſſively, the crops will generally fail, the haulm come up curled and blighted, and the roots will be worm-eaten and cankered. The cauſe of this may perhaps be aſſigned. Every ſpecies of plant is provided by nature with pores of ſuch construction and magnitude as are capable of receiving thoſe particles of nouriſhment only whoſe dimenſions are correſpondent to the ſaid pores: Hence every ſpecies muſt receive or imbibe the aboveſaid particles only, and reject all others; and, conſequently, if the ſame ſpecies be planted, or ſown, upon the ſame ſoil, for two or three years in ſucceſſion, the greater part of ſuch particles will be exhauſted, and the plants cannot flouriſh for want of proper nouriſhment.

Potatoes ſhould not be planted deeper than four inches or four inches and a half, and the ſeed or ſetts ſhould lie one inch or one inch and a half above the dung. Whole potatoes ſhould be planted at the diſtance of two feet and a half or three feet ſquare: cuts at the diſtance of eighteen inches ſquare.

I have ſeen potatoes planted in this pariſh upon ground without dung ten or twelve inches deep, and at the diſtance of eight or nine inches. Theſe crops have always failed, and, as I ſuppoſe, for want of proper nouriſhment.

I have tried the following experiment for theſe five years laſt paſt:—The firſt year, on the ſame day, and in the ſame ground, I planted whole potatoes in ranks, at the diſtance of three feet ſquare, and cuts of the ſame kind at eighteen inches ſquare. For the laſt four years I have planted whole potatoes at the diſtance of two feet and a half ſquare, and cuts at eighteen inches. The whole ſets were earthed up three or four times; (*i. e.* as long as the haulm would ſtand) and a few ranks of the cuts were earthed up alſo. The whole ſets have always produced a greater crop than the cuts, in proportion to the quantity of ground; and the potatoes have been larger and fairer. I have obſerved little or no difference in the produce of the cuts, whether the ranks be earthed up or not. This, I think, may be thus accounted for:—if any benefit is to be received from earthing up a plant, it muſt be becauſe more nutriment is thereby added through the pores of the haulm or ſtalk. Now there was ſufficient room in the ranks that were planted with *whole ſets* to earth them up equally on every ſide; but not ſo in the cuts, for the earth which was added on one ſide of the plant was taken away on the other.

There is a ſmall white early ſort of potatoe, which, of late years, has been much cultivated at Altringham in Cheſhire. They plant this ſpecies in January, or as ſoon as the earth is dry and the weather mild. This ſpecies never blows; but is fit for uſe a month or ſix weeks ſooner than any other kind.

I have known the following experiment tried with good ſucceſs:—They plant in October, and if there come any ſevere froſt without ſnow, they cover the potatoes with peaſe-haulm, bean-ſtalks, ſtraw, or other light covering. The whole crop is dug up in May, and another ſort immediately put in, which is alſo dug up in October following. I have eaten new potatoes thus raiſed in April. This ſpecies hath been of late introduced into this pariſh from Altringham, but they plant too late, never cover from froſt, nor change the ſeed.

I am, &c. J. HIGSON.

ARTICLE VII.

On the Culture of POTATOES.

[Communicated by the Norfolk Agriculture Society.]

Norwich, Jan. 13, 1776.

AT a general quarterly meeting of the Norfolk Society for the encouragement of Agriculture,

B. G. DILLINGHAM, Eſq; in the chair,

A premium of three guineas was adjudged to Mr. *Joſeph Wright*, of Great-Melton, for planting and gathering the beſt crop of potatoes, the quantity of land being one rood, and the produce ninety-one buſhels.

The Society cannot but recommend, in the ſtrongeſt terms, a more general attention to the culture of this moſt valuable root. In the preſent inſtance, and that not a very extraordinary one, the labour and expence of the huſbandman are amply rewarded by the produce, as appears from the following particulars of Mr. *Wright's* experiment. The public too muſt reap advantages of the moſt important nature, as the potatoe, beſides being an excellent wholſome food in various modes of application, is well known to make a ſweet and nouriſhing bread when mixed in equal quantities with the flour of wheat.

It is almoſt unneceſſary to obſerve to the intelligent farmer, that as good a crop of wheat may be expected after well-cultivated potatoes, as in any other mode of huſbandry.

Calculation for cultivating one acre of land with potatoes, according to Mr. *Wright's* expences, and the valuation of this crop:——

	£.	s.	d.
One deep ploughing, — —	0	4	0
Seed 32 buſhels, at 1s. per buſhel, —	1	12	0
*Manure 24 loads, at 2s. per load, —	2	8	0
Expence of ſetting, the weather being ſo dry that the ſets were put in with an iron crow, — —	1	0	0
Hoeing and earthing up ſeveral times,	1	0	0
†Expence of taking up, ——	5	8	0
Rent and other charges, ——	1	10	0
	13	2	0
Produce 364 buſhels, at 1s. per buſhel,	18	4	0
Clear profit,	£. 5	2	0

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* It ought to be obſerved, that only half the expence of manure ought properly to be charged to the potatoes, as the land remains in fine order for any ſucceeding crop. Nothing is charged by Mr. Wright for carriage of the crop to market; but as he has valued them at only one ſhilling a buſhel, which is greatly under the uſual market price, it may be ſuppoſed they were either ſold at home, or that the expence of carriage, ſale, &c. were deducted in that eſtimate.

† The price charged in this calculation for taking up the crop appearing to us extraordinary, our Secretary was directed to enquire particularly into that article. He did ſo; and received for anſwer, that Mr. Wright had all his ground ridged up when the crop was gathered, for the greater conveniency of getting them out as clean as poſſible;—that he alſo had the crop picked over and ſeparated into two or three different ſorts, which took up a conſiderable time;—and that he gave the people employed victuals and drink all the time, which was all included in the general expence mentioned.

From

ARTICLE VIII.

Abſtract of a Letter on the Culture of Potatoes.

GENTLEMEN,

OF all the roots produced in our fields and gardens, none appears to be of ſo much conſequence as the potatoe. As food for the poor, they are certainly to be preferred to turnips; and might be rendered equally uſeful for cattle. As a fallow crop, they tend greatly to meliorate

From this explanation it appears, that an acre of potatoes, producing 364 buſhels, may probably be taken up in the uſual way for about half the expence he has rated it; and when half the expence of manure is taken alſo from his eſtimate, we think the net profit of an acre ſo cultivated, and producing ſuch a crop, would be at leaſt nine pounds. It may perhaps be ſaid, that in many places the rent of ſuch land as is proper for this purpoſe would be higher than he has ſtated it; but, admitting this to be the caſe, the price of the crop when ſold would exceed his eſtimate ſo much as to balance the account.

To theſe certain advantages ariſing from the cultivation of potatoes as a food for our tables, we wiſh to call the attention of our readers to a ſtill further uſe in which they would be a very profitable production; we mean, for feeding ſwine and cattle. For theſe purpoſes, they are an excellent hearty food, and it has been proved by experience that ſwine and cattle will eat them very freely.

the

the ſoil; being in this reſpect equal to turnips; and, in general, pay the owner of the land much better.

Some perſons have objected to the general cultivation of potatoes, from the apprehenſion of wanting a market; but while they are retailed out at two ſhillings and ſix-pence, or even at two ſhillings a buſhel, (and it is very rarely that we can purchaſe them lower) this apprehenſion will be groundleſs.

Add to this, that potatoes may be very profitably uſed as food for cattle and hogs. No food is better for rearing and fattening the latter. Cows and oxen will alſo eat them freely, and they are more eaſily preſerved from froſt than turnips: Hence they would prove an excellent ſuccedaneum at the ſeaſon when ſpring food is moſt wanted.

If potatoes were introduced regularly in the farmer's courſe of crops, on light good ſoils, great advantages would enſue. He need not be at the trouble and expence of having them dug up clean. Let him only take up the beſt part, and then turn his ſwine in: they will gather and fatten on the reſt, and repay their value in the manure they leave behind them.

Potatoes grow beſt in a ſoil that is looſe and deep, where the ſwelling of the roots meet the leaſt obſtruction, and where they draw the greateſt nouriſhment moſt eaſily. On this account, where the quantity intended to be raiſed is ſmall, digging is preferable to ploughing. But if the land be ploughed deep and well pulverized, ſucceſs need not be doubted. They ought to be planted in lines, eighteen inches apart, and at twelve or fourteen inches diſtance in each line or row. This will give opportunity for earthing them up with the horſe-hoe while young, which will greatly promote their fertility. If the horſe-hoe is not intended to be uſed, plant them a foot ſquare, and earth them up with hand-hoes ſeveral times, which, although more expenſive, will repay the coſt.

Care ſhould, however, be taken, in the latter hoeings eſpecially, not to go too near the plants, leſt you cut the roots. You need only, after they are weeded by hand, to draw up the earth from the centre round each plant. Vaſt quantities may be obtained by a little additional labour in keeping them clean, and the land will be left in excellent order for ſucceeding crops. It is neceſſary to obſerve, that the ſame kinds ought never to be planted twice together on the ſame land; nor the ſame land ſet with potatoes more than two years at the longeſt. When raiſed from the ſeed, great varieties, and ſome excellent new kinds, will be obtained.

I am, &c.

T. PAVIER.

Monckton, near Taunton,
March 1, 1779.

ARTICLE IX.

State of Agriculture in the Iſle of Wight.

[Communicated by a Gentleman who lately viſited that Iſland.]

GENTLEMEN,

HAVING lately been in the Iſle of Wight, principally with a view to obtain ſome authentic information relative to the mode of huſbandry and produce of that iſland, I have ſelected the following remarks from notes taken on the ſpot, and beg leave to preſent them to your Society.

Firſt, *the Nature of its* SOIL.

This iſland is finely diverſified with gently-riſing hills, and fertile well-watered valleys. The hills, being generally cultivated, and abounding with ſprings, are very fruitful; ſome few excepted, which afford good feed for ſheep.

In ſome parts, the ſoil is gravelly, and abounds with flints like that of Hampſhire. In ſome other parts, it is a ſtrong clay; but, in the general, it conſiſts of a fine hazel loam, mixed with juſt enough ſand to make it work kindly, and render it eaſily penetrable to the tender fibres of grain and plants.

Being ſurrounded by the ſea, the air, and conſequently the dews and vapours when condenſed and falling in rain, are impregnated with ſalts, which add greatly to the fertility of the ſoil.

Rents, are in general from ſixteen to twenty-one ſhillings per acre; ſome meadow-lands, near the principal towns, conſiderably higher.

MANURES.

I was informed by ſeveral farmers, that, 'till within a few years paſt, lime was almoſt the only manure uſed in the iſland, farm-yard dung excepted: but of late chalk has been much ſubſtituted in its ſtead. The farmers find, from experience, that chalk is more operative and laſting. Thirty waggon-loads, of forty buſhels each, are generally laid on an acre, and laſt from ten to fifteen years. It is, however, the general opinion, that a ſecond chalking is of little ſervice. Their chalk is of a hard kind, both blue and white: the former, I think, might with greater propriety be called marle, as in texture and quality it very much reſembles the blue marle found in Somerſetſhire; but with this difference, that in putting it in vinegar the effervеſcence is not ſo ſtrong. Of this kind they lay twenty loads on an acre; and I was told, that in lands thus chalked more than thirty years ſince, the benefit is ſtill very apparent.

In ſundry articles of good huſbandry the farmers in general ſeem ſtill very remiſs. They neither gather in their ſtubbles, nor confine their cattle to the farm-yard in winter. Hence their ſtock of farm-yard manure is ſmall in compariſon of what it otherwiſe might be: add to this, that they are not in the practice of digging up the borders of their fields, or mixing up heaps of compoſt.

In thoſe parts contiguous to Newport and Weſt-Cowes, the ſoil is naturally the leaſt fertile; but as great quantities of ſtable-dung are made in thoſe towns, and eagerly bought by the adjacent farmers, the deficiency is pretty well ſupplied, and the produce of their lands nearly equal to that in other parts of the iſland.

Their general inattention to ſea-weed* is another proof of their deficiency in the knowledge of manures.

On the eaſt, ſouth, and weſt coaſts, the ſea beats with great violence, and throws up vaſt quantities of weeds on the beach, which might be collected with little expence, and being mixed in compoſt with lime and earth, or dung, would prove a moſt valuable and fertilizing manure in thoſe places where it is moſt wanted.

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* We cannot help expreſſing our ſurpriſe, that this excellent manure ſhould be ſo much neglected as it is on the banks of the Severn; but it ſeems almoſt impoſſible to make common farmers ſenſible of the advantages ariſing from improvements, not made by their forefathers.

I enquired of divers farmers why they did not thus apply a treaſure which nature had ſo amply furniſhed them with. The ſubſtance of their anſwer was, “ that it never had been uſed unleſs to “ mix with chalk for their bean lands, and that “ they apprehended it promoted the growth of “ weeds ;” not conſidering that whatever promotes the growth of weeds muſt, for the ſame reaſon, promote the growth of grain, and that its fertilizing the ſoil is the cauſe of both.

Course *of* Crops, *and Produce per Acre.*

In the Eaſtern part of the iſland, the uſual courſe of crops is, on a ſummer-fallow,

1 Wheat
2 Barley or Oats
3 Clover and Ray-graſs, one year
4 Wheat, Barley, or Oats.

About the centre of the iſland, the following courſe is moſtly adopted:—

1 Turnips
2 Barley
3 Clover
4 Wheat
5 Barley
6 Clover
7 Wheat.

On the North-Weſt part, after a fallow,

1 Wheat
2 Barley, or Oats
3 Clover and ray-graſs, or hop-clover two years:—

Or, which is a ſtill better courſe, and ſimilar to the Norfolk,

1 Turnips
2 Barley
3 Clover and Ray-graſs
4 Wheat.

When they break up clover-lays for wheat, they ſeldom plough more than once; but give four ploughings to their fallows. They ſow all broad-caſt, and in general reap from three to four quarters per acre.

For Barley, they plough three times, ſow four buſhels, and the produce is from five to ſix quarters per acre on an average.

For Oats, they plough but once, ſow four buſhels and a half, and the produce is about five quarters on an average in return.

But on the Southern part, particularly near Godſhill, they ſow oats after turnips, and reap from eight to nine quarters per acre.——Theſe are very great crops, but the land in this part of the iſle is a fine rich loam, which cannot fail of producing large crops of whatever grain is ſown upon it.

On ſome of the ſtiff clays, they plant Beans; and, very unneceſſarily, ſet nine or ten pecks per acre; for the ſetting of which they pay two ſhillings and four-pence per buſhel. They never hoe them; but, notwithſtanding this bad management, theſe clay-lands are ſo rich and well adapted to this ſpecies of pulſe, that they produce in general five quarters per acre.

The Turnip Huſbandry ſeems to be but imperfectly underſtood. In the northern part of the iſle they are not hoed at all. In the eaſtern part, they plough four times, harrow, and hoe once. They feed them all off with ſheep, and value the crop at fifty ſhillings per acre. Strange it is, that the proper mode of culture, and real value, of this excellent root ſhould be ſo little known or attended to!

Of Clover, they generally cut two tons per acre, and then let it run to ſeed. Sometimes they ſow tares or vetches after clover, and moſtly cut them green for horſes. In the ſouth-weſt parts, they ſometimes ſow them for feeding ſheep.

On ſome of their moſt ſandy lands, they ſow buck-wheat, but the quantity is ſmall, and it is only uſed for fattening ſwine.

The paſture-lands, eſpecially in the valleys, are very rich, and produce excellent hay, which is ſtacked in the neateſt and beſt manner I ever ſaw. But as moſt of the farmers keep dairies, the greateſt part of the graſs is fed off. To each cow they allot one acre and a half of graſs. Their cows are moſtly of the Alderney breed, many of which yield eight pounds of butter per week. Their winter food is ſtraw before calving, and then hay.

Where the lands are wet, they make excellent covered drains, with chalk and heath or ling. I examined ſome, and never ſaw any executed in a better manner. Many quick-hedges have been raiſed within theſe twenty years, and are in fine order; but in ditching the farmers appear to be very deficient.

I am, &c.

May 8, 1779.

ARTICLE

ARTICLE X.

On the Diſeaſe called the Goggles *in Sheep.*

[By a Gentleman in Wiltſhire.]

GENTLEMEN,

WITHIN theſe few years, we have had a diſeaſe among the ſheep, now generally known by the name of the *Goggles*; a diſeaſe which has deſtroyed ſome in every flock round this county, and made great havock in many.

The ſheep moſt ſubject to it are *two teeth*. It is not infectious, but hereditary, and undoubtedly runs in the blood. It has no affinity with giddineſs, for they do not run round. It moſt reſembles the ſtaggers in lambs, with this difference, that whereas ſtaggery lambs ſhew a weakneſs before, and fall forward, goggly ſheep ſhew a weakneſs behind, and fall backward, when forced to run.

When firſt obſerved to be diſeaſed, their ears drop, and they rub their tails much more than other ſheep; they then diſcover the weakneſs above-mentioned, and grow poorer and weaker till they cannot drag their limbs behind them, and at length die.

I have examined a few, and found the viſcera all ſound. I have blooded one, and found no inflammatory cruſt. I can neither myſelf imagine, nor find one who can venture even to conjecture, the cauſe.* As it is a matter of conſequence, perhaps, were you to make it the ſubject of the two following premiums, it might be a means of ſtopping its progreſs: the firſt, to the ſurgeon who ſhall diſſect the greateſt number of goggly ſheep, and give the moſt accurate deſcription, with the beſt obſervations on the diſeaſe; and the ſecond, to the perſon who ſhall diſcover an effectual cure.

I am, Gentlemen, &c.

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* It has been ſuggeſted to us, that the ſeat of this diſeaſe, moſt probably, is in the ſpinal marrow.

ARTICLE XI.

Deſcription of a newly-invented Machine for Raking Summer-Corn Stubbles.

GENTLEMEN,

ABOUT three years ſince I found ſome difficulty in procuring hands to take up my lent or ſummer corn in the method uſually practiſed in this county, that is, by forking the ſwarths into cocks, and raking the ground with hand-rakes by women. Men are generally employed in forking it. It therefore occurred to me that an inſtrument might be made to anſwer the purpoſe of raking it by hand. I knew the Norfolk method of doing it by drag-rakes, (as they are called) drawn by men; but the men were wanting elſewhere. I had often ſeen a horſe-rake, made for gathering the *gramen canine* or couch-graſs together upon fallow lands, and knew a farmer who had uſed it for his mown wheat ſtubbles; but this rake being drawn from the end of the beam by the horſe, dragging the ends of the teeth upon the ground, collected ſuch quantities of weeds, graſs, earth, and ſtones with it, as nearly to render the corn of no value; beſides, it could not be uſed for cloſe-mown ſtubbles at all. Having for many years uſed the Norfolk ploughs here, I thought a rake might be ſo conſtructed as to go on the breaſt-work of one of theſe ploughs in the ſame manner as the plough itſelf is uſed.

I therefore had one made nine feet and a half long, and the teeth ſix inches aſunder. Upon applying it in the place of the plough on the breaſt-work, I found it anſwered extremely well, except that when it met with any conſiderable obſtruction at one end, it drew the other end aſlant. To remedy this inconvenience, I took away the pillar (the part of the breaſt-work that the beam reſts upon, and which is raiſed higher, or let down lower, to ſink or raiſe the plough) and had another made to extend about a foot or rather more beyond the outſides of the ſtandards, and from each end of the chain, made to let out or take up at pleaſure, to each end of the pillar: this kept the rake even and ſteady. To my great ſatisfaction, I found it ſucceed even beyond my expectation; for by means of this breaſt-work, it could, like the Norfolk plough, be inſtantly ſet up or let down to the greateſt degree of nicety; ſo that any ſtubble, whether cut high or low, whether very full of graſs or clover, or quite clean, might be raked by it with equal facility; for the teeth being made very much curved, the lower part of the back of the teeth reſts upon the ground, and the points ſtand out of it. The weight of the rake preſſes the teeth cloſe to the ground, and the corn is gathered into the throat of the rake, without digging up the weeds or the ſoil. The teeth are made ſufficiently ſtrong to prevent their bending. I have found a rake of the length above-mentioned very manageable; whether it would do better if made longer muſt be left to future experiments. I was determined to this length by the breadth of our gate-ways, being juſt enough to admit it through them without taking it to pieces.

For perſons who want to remove it to a diſtant part, two ſmall wheels might be added, to put on occaſionally at the ends, to raiſe the teeth from the ground as it is drawn along the road.

I am ſenſible, that if a low wheel were fixed at each end, even when in its work, it would greatly leſſen the friction, and the horſe would draw it the eaſier; but it would render it more complex, and, perhaps, occaſion it not to turn ſo eaſily at the ends of the land. I have, however, had it in idea, to fix ſome kind of ſtandard on the head of the rake for a line, like the Norfolk plough-lines, to come back to, that the man might guide the horſe himſelf, and ſave the expence of a boy to lead him; but to this there ſeem to ariſe ſome objections.

One horſe, and a boy to lead him, with a man to clear the rake, will eaſily rake twelve acres of ſtubble in a day; and if two horſes are taken into the field, to be uſed alternately, twenty acres might be raked in the ſame time; but this would be hard work for the man.

The manner of uſing it is as follows:

The rake being put on the breaſt-work of the Norfolk plough, in the ſame manner as the ploughs are, the horſe draws it with the ſame traces, &c. (only in the plough two horſes are uſed, and here but one) and being ſet into its work to a proper height, according as the ſtubble is long or ſhort, the boy leads the horſe acroſs the ridges, the corn being previouſly put in cocks by the forkers; the man follows the rake, and when it is filled, he ſpeaks to the boy, who ſtops the horſe, and puts him back a ſtep or two. This is done that the man, by drawing the rake back a little, may the more eaſily and ſpeedily free it from the corn; then lifting it up, and the horſe inſtantly going on, he drops the rake juſt beyond the ridge thus gathered together. This he repeats as often as it is full, till he reaches the end of the land. Then he turns, and, coming back by the ſide of the part raked, empties the rake adjoining to the other. By this means the raked corn lies in ſtrait rows acroſs the field, and, when dry, is turned if neceſſary, gathered up, and carried away. —I am ſatisfied it might alſo be advantageouſly employed in raking upland hay-ground, and all ſorts of ſeed clover-land.

It may not be amiſs to mention, that in the firſt rake I made, the teeth were only 3 inches aſunder. I ſoon found they were too cloſe. Taking, therefore, every other one out, I made another 6 inches aſunder—the holes in the firſt not being filled up, the teeth might, if neceſſary, be replaced, and then would be thick enough to rake any gentleman's lawn which is kept frequently mown.

I am, your obedient humble ſervant,

Piddletown, Dorſet. GEO. BOSWELL.

[Mr. Boſwell lately publiſhed an ingenious Treatiſe, intitled *An Attempt to reduce the modern Method of Watering Meadows into a regular ſyſtem.*]

ARTICLE XII.

On the Cultivation of CLOVER.

GENTLEMEN, *Dec.* 20, 1778.

AS I apprehend every experiment in Agriculture, which is attended with any remarkable degree of ſucceſs, may be of ſome uſe when made public, I take the liberty of tranſmitting the following to your Society.

A neighbour of mine, who is a very good farmer, had a field containing thirty-eight acres, the ſoil a cold wet clay, which, for ſome years after he held it, ſcarcely paid its rent. Determined, however, to try what could be done with it, he under-drained it, and in the ſpring 1775, mended it with turf-earth, digged from the borders of fields and highways, mixed with ſtable-dung. In March he gave it a good ploughing, and ſowed it with Zealand barley: after the barley came up, he threw in ten pounds of the common red clover per acre.* The advantages of the under-draining and manure were ſoon apparent. The barley was an exceeding fine crop, producing ſeven quarters per acre on an average throughout the field.

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* Six or ſeven pounds per acre is ſuppoſed to be a ſufficient quantity.

The following ſpring the clover ſhot early, and in the ſummer proved a very ſtrong crop. In May he turned in all his cattle, which, by the 10th of June, had fed it off quite bare. He then took them out, and let the clover ſtand for ſeed. The ſummer proving wet, it ſucceeded well, and the average produce of the field was ſeven buſhels and a half per acre, the whole of which he ſold at thirty-nine ſhillings per buſhel—amounting to 555*l.* 15*s.*

As ſoon as the ſeed was off, he ploughed the field for wheat, and ſowed it broad-caſt, with the red Lammas kind from Kent. The crop was excellent, and the produce four quarters per acre.

With the ſame huſbandry, I had, laſt ſummer, thirty-nine buſhels of clover-ſeed from three acres of land, notwithſtanding the dryneſs of the ſeaſon, but the land was ſomewhat better in quality.

J. B.

S——d, Eſſex.

ARTICLE XIII.

Circular Liſt of Queries ſent by the Society at Bath to the High Sheriffs of the different Counties in England;—with the Anſwers tranſmitted by the High-Sheriff of Suffolk.

IN June 1778, the Society formed the following liſt of queries, relative to Agriculture; and directed them to be tranſmitted to the High Sheriff of every county, requeſting him to procure anſwers thereto from ſome of the beſt farmers, and ſend to the Society.

Queries from the Bath Agriculture Society.

1ſt. What are the kinds of ſoil from which you generally obtain the beſt crops of wheat, barley, peaſe, oats, beans, vetches, turnips, carrots, and cabbages? And what are the uſual quantities of ſeed ſown, and the average annual produce per acre Wincheſter meaſure?

2dly. What is the uſual courſe of crops adopted by your beſt Farmers on the different ſoils?

3dly. What manure now generally in uſe do you find moſt ſerviceable, on the following ſoils reſpectively,

tively, viz. Stiff clays, light ſand, gravelly, moory, cold and wet, or what is called ſtone braſh land? what quantities are the ſeveral manures laid on per acre,—at what ſeaſon,—and how long will each laſt without renewal?

4thly. Have you diſcovered any *new* manure more efficacious than thoſe generally uſed, and which may be eaſily obtained in large quantities? if ſo, what is it, when and how applied?

5thly. What is the beſt top-dreſſing for cold wet paſtures, which cannot be eaſily drained?

6thly. What materials do you find beſt and moſt laſting for drains, or land ditches?

7thly. What are the kinds of wood which you have found from experience to thrive beſt on bleak barren ſoils, cold ſwampy bogs, and black moory ground?

8thly. What are your methods of raiſing lucerne, ſaintfoin, and burnet?—On what lands do you find them to anſwer beſt, and what the average produce?

9thly. How is your turnip huſbandry conducted; and what is the beſt method of preventing or ſtopping the ravages of the fly on the young plants?

10*thly*. Do you prefer the drill to the broad-caſt method of ſowing grain;—in what inſtances, and on what ſoils?

11*thly*. What is the comparative advantage of uſing oxen inſtead of horſes in huſbandry?

12*thly*. What have you found to be the moſt effectual preventative or remedy for the rot in ſheep?

13*thly*. What new improvements have you made or adopted in implements of huſbandry?

To the above Queries the Sheriff of the county of Suffolk favoured the Society with the following Anſwers; which he informed them were given him by a very good farmer, and approved by all who had ſeen them.

To the firſt and ſecond.—Good ſtrong mixed ſoil. Wheat on a clover-lay, after one year, once ploughed, and ſown broad-caſt, with ten pecks per acre, well harrowed in;—average produce, from three quarters and a half to four quarters per acre.

To prepare for Turnips, the year following, ſummer-till the land; turn in the wheat-ſtubble about December a moderate depth, and let it reſt till the March following: harrow it well; then turn it in ſomewhat deeper, below the firſt ploughing, the deeper the better; for turnips thrive beſt where there is a plenty of deep mould. In May repeat the harrowing, and turn it up with a fine riſt balk. After it has taken the benefit of the ſun, harrow it down, and gather out the ſpire-graſs, &c. which ſhould be burnt in heaps upon the land. If it is not clean, repeat this a ſecond time; then give it a clean earth, and harrow it down. Manure it with twelve loads of ſhort dung, or eighteen of long dung per acre. At Midſummer plough the dung in a good depth with a cloſe furrow, and ſow the ſeed cloſe after the plough. Sow from one pint and a half to two pints and a half per acre, as the ſeaſon and quality of the land may require. In a month the plants will be fit to hoe. When they nearly cover the land, hoe them a ſecond time, with a ſeven or nine-inch hoe, and leave the plants at leaſt fourteen inches aſunder. The price of hoeing here is generally four ſhillings and four-pence per acre the firſt time, and two ſhillings and two-pence the ſecond. Set them out at leaſt a foot diſtant from each other. A good crop will produce from thirty to forty cart loads per acre, which for many years paſt, have ſold for from three to four pounds per acre.

2dly. To prepare for Barley to lay in with Clover, plough the ſaid lands in February, as they are preparing and clearing off the turnips. Two *ſtriring* and one *ſowing-earths* will be ſufficient. Three buſhels per acre, well harrowed in, will be a good ſeeding. Then throw in broad-caſt from nine to twelve pounds of clover-ſeed* per acre, ſtruck over with a light harrow. Roll it down, or otherwiſe, as the ſeaſon proves wet or dry. Average produce, from three to five quarters per acre. The following year clover, two crops in the ſeaſon; firſt mowing in June, the latter in September; the general produce from three to four tons per acre. In October ſow the clover-ſtubble with wheat, as above directed, without manuring, or it will be winter-proud if the land be rich.

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* We apprehend ſix or eight pounds of clover-ſeed would be fully ſufficient; and that the clover ſhould not be ſown earlier than a fortnight after the barley. If they are ſown together, the clover, in rich lands eſpecially, will be apt to get above, and choak the barley crop.

3dly. To improve ſtiff Clay-Lands, lay on coarſe waſh-ſand, cinder-duſt, wood-aſhes, ſtreet-dirt, or ant-hills quartered, taken up and burnt. Theſe mixed together, and laid on from thirty to forty cart-loads per acre, will laſt twenty years. If in plough tilth, keep it up with good rotten dung. If the land is not kind for clover, ſummer-tilth for wheat. Small beans, vetches, and grey peaſe, will make proviſion for wheat, if clean and well-conditioned. Red Lammas wheat is beſt for cold lands. Vetches cut green are excellent fodder for horſes—if ſeeded, they yield from two to two quarters and a half per acre; grey peaſe, three quarters: Wheat does well after them.

The above land, if laid down for three or four years until it becomes a thick flag, and then covered on the flag with forty tons of clay, or twenty tons of marle, or twelve tons of ſoapers' aſhes, per acre, will produce good corn and clover for twenty years.

For gravelly, cold, or wet lands, under-drain, if it lays with a proper fall;—by thus removing the cauſe, the effect will ceaſe. Summer-tilth, and make it clean; lay on from thirty to forty loads of ſand per acre, if a little loamy, the better; or about ſixteen loads of the above-mentioned compoſt, or ten or twelve tons of ſoapers' aſhes, laid on in hard froſt, will anſwer well.

4thly. We have not diſcovered any new manure more efficacious than thoſe above-mentioned. The burning of clay in kilns has been talked of, but not yet practiſed.

5thly. In cold wet paſtures that cannot be under-drained, make open drains, ſloped off eaſy on each ſide; keep them open, and make them with proper falls: then lay on ſoot, lime, or lime-rubbiſh, ſoapers' aſhes, ſtreet-dirt, &c. about fourteen loads per acre, and it will laſt fourteen or ſixteen years.

6thly. Materials for under-draining are, alders and ſallows, or ling and black-thorn buſhes, cut and laid in green, covered with peaſe or wheat-ſtraw, and above it ſtrong clay. Drains thus made will laſt twenty years.

7thly. The kinds of wood we find to flouriſh beſt on boggy ſoils are, alder, ſallow, willow, and poplar. Scotch fir does well in a barren ſoil, eſpecially if it has a gravelly bottom.

8thly. Theſe graſſes are not raiſed with us.

10thly. We moſtly prefer the broad-caſt to the drill huſbandry.

11thly. We know of no other advantage in the uſe of oxen, than that of keeping leſs ſtock; as horſes are more expeditious, and will pay for their keeping by extra labour.

12thly. The moſt effectual preventative for the rot in ſheep is to keep them on dry land; it being found, by general experience, that wet lands bring the rot upon them, eſpecially if the feed is bare. In order to cure them, many experiments have been tried, but to little purpoſe.

13thly. Few new improvements in implements of huſbandry, that are of much conſequence, have been made or adopted in this part of the country.

General Rules for the Improvement of Lands, by Claying and Marling, as practiced by us.

1. Lands that have been many years in plough tilth, and are become foul, may be made clean by a ſummer-

a ſummer-tilth. When this is done, lay on from ſixty to eighty tons of clay, or from twenty to thirty tons of marle, per acre. Work it well into the lands, and then ſow turnips as before-directed. Feed the turnips off, or at leaſt half: by the treading of the cattle and their manure, the clay will incorporate and work more kindly with the ſoil. The ſpring following ſow it with barley. Or,

To clay upon a clover ſtubble before the wheat is ſown, is a very good method;—it will be fit for a ſummer-tilth the next year.

2. To improve waſte or heath-lands, clay or marle on the flag, from thirty to forty loads of marle, or one hundred and twenty tons of clay, per acre. Turn it in with a good whelming-plough, a moderate depth, in the beginning of February; the ſooner the better. If the ſoil be red and ſandy, ſow it with white oats. If a black gravelly ſoil, ſow black oats in the middle of March, at leaſt four buſhels per acre. As ſoon as the crop is off, ſow ſix pecks of rye per acre on one ploughing: this will make excellent ſheep-feed, and expoſe the clay to the winter froſts: then ſummer-tilth for turnips; feed them off in March

with ſheep or other beaſts. Such manuring is beſt for ſuch lands.

If it is a kind of loamy ſoil, ſow barley; if a black gravel, oats. Experience teaches knowledge. Try a lay of clover with the following mixture, viz. clover-ſeed, and black and white nonſuch. If the lay takes, *ſet* red wheat upon it —ſuch lands ſometimes produce three quarters per acre. When they begin to wear out, improve them by the following method:—lay them down with ſuch graſs-ſeeds as ſhall be thought proper, and let them reſt for three or four years till they become a flag.

Another method of improving ſuch lands is, to lay them up againſt winter in round ridges, four furrows on a ridge. Early in the ſpring, or ſooner if the ſeaſon will admit, turn it back, and make an early ſummer tilth; then ſow it with buck-wheat, ſix pecks per acre, and let clover follow, as above directed. Forbear feeding it in the ſpring, as ſuch land will not bear treading.

It will anſwer to lay it down with any kind of graſs-ſeeds in the above method, and for a longer time. Let the land be well drained, for wherever the water ſtands, the clover will decay. Sow buck wheat the latter end of May; it will produce three quarters per acre.

On ſtrong rich lands, clover lays with nonſuch, or any ſtrong flag, *ſet* wheat, as it will anſwer far better than ſowing it broad-caſt. Three pecks and a half per acre, ſet in two rows on each flag, is ſufficient. Strike it over with a light harrow buſhed. The ſaving of ſeed more than pays the planting when wheat is only 5s. the buſhel; the price of planting from eight to ten ſhillings per acre.* Small tick beans, 7s. per acre planting, hoeing 6s.; produce 3½ quarters to 4 quarters per acre. Windſor tick beans, 7s. planting; 6s. hoeing; produce four to five quarters per acre.

ARTICLE XIV.

On the Uſe and Effect of MARLE *in Norfolk.*

[By a Gentleman Farmer in that county.]

GENTLEMEN, *March*, 1778.

IN anſwer to your enquiries reſpecting the uſe of marle in this county, our farmers ſeldom lay it on paſture, but conſtantly on arable land, from thirty to eighty, and, in ſome inſtances, to one hundred loads per acre. By a load, I mean as much as a cart and three horſes can draw. They prefer laying it on a clover and ray-graſs, or a barley ſtubble, or layer, a year before it is ploughed in. By this means it is more intimately mixed with the upper part of the ſoil, and will not be ſo ſoon buried by the plough, as when laid on and turned in immediately.

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* The expence is now reduced to about ſix ſhillings per acre.

The marle moſtly found with us is, a white pure calcareous ſubſtance like chalk, but fat and unctuous. When it is met with of any other colour, our farmers will ſcarcely be perſuaded it can be marle. This I experienced a few years ſince, upon diſcovering in my park a fine light brown, or rather dove-coloured marle, with every other property like the white.

The effect of marle has been very great indeed in this county, having advanced the rent of lands upon which it has been laid, in ſome inſtances, from half a crown to ten ſhillings an acre and upwards. This improvement has been chiefly made on light ſandy ſoils; but marle has been found beneficial on all ſoils. The general opinion with us is, that it not only gives tenacity to the ſoil, but acts alſo as a manure by virtue of its ſalts. Our farmers, after the firſt dreſſing of marle alone, mix it with dung or compoſt, and think it much improved thereby.

When I ſay *our* farmers, I mean the Norfolk farmers, for I do not know that there is one marle pit within two or three miles of me; or that any marle has been diſcovered within that diſtance, except what I mentioned to have found in my own park, which was applied wholly on the graſs thereof, being no more than what was dug out of a foſſe I was making.

Our uſe of lime is trivial; and no great benefit has been found to reſult from it here: but this is entirely owing to its having been uſed in ſuch ſmall proportions as could not poſſibly have much effect. This, however, is no argument againſt the uſe of lime: by a like management, dung, or any other manure, would prove equally uſeleſs.

Your idea of the turnip huſbandry is perfectly juſt; but an effectual method to prevent the ravages of the fly remains, and I fear will ſtill remain, a deſideratum in huſbandry.

One obſervation, made by our farmers, I have generally found to be juſt; to wit, that the miſchief is greateſt in the midſt of the land; and have frequently found, that when every other part of the crop was deſtroyed, two or three ridges next the hedges have eſcaped all injury. This, with ſome other particulars, carefully attended to, may, hereafter, lead to ſome method of preventing the evil.

I am, &c.

ARTICLE XV.

On Feeding Wheat in the Spring with Sheep.

[By a Gentleman Farmer in Eſſex.]

GENTLEMEN,

I Now comply with your requeſt in giving you my thoughts on the practice of feeding off wheat with ſheep in the ſpring, and alſo an account of my ſucceſs therein laſt ſpring.

This practice ought not to be generally adopted, even where the crop is rank, or, as we term it, *winter-proud*; becauſe, in many caſes, it would not anſwer any good purpoſe, but, on the contrary, injure the crop. In ſome inſtances, however, it has ſucceeded, and the advantages are theſe:—it affords feed for ewes and wethers when turnips are over, and before the ſpring feed comes in; it cauſes the wheat to branch out into a greater number of ſtalks than it would otherwiſe do, and, of courſe, the crop is increaſed: by the warmth of the ſheep when lying on it, and the manure they leave, the crop is brought forwarder, and the grain heavier than it otherwiſe would be. In light lands eſpecially, the treading of the ſheep fixes the earth about the roots of the corn, and cauſes the ground to retain its moiſture longer in a dry ſpring.

On the other hand, this practice is liable to the following diſadvantages:—in ſome lands it checks the growth of the corn, and makes the ſecond ſhoots weak and ſmall—of courſe the ears will be ſmall, and the grain light in proportion;—in foul lands and a wet ſeaſon, it gives opportunity for the weeds to riſe above the corn ſo as to choak it. Sheep are alſo apt to bite off the knot of the plant.*

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* To prevent this, the Farmer ſhould turn them in hungry, and take them out as ſoon as they have filled their bellies. When hungry, they will eat the leaves of the plant; but when their hunger is ſatiated, they will pick out the knot or crown of the plant, that being the moſt ſweet and delicate.

This practice anſwers beſt on clean land, and a light ſoil. Here the treading of the ſheep is of ſervice; and there is no danger of the weeds riſing ſo as to injure the crop.

In September 1777, I ſowed fourteen acres of wheat, which, ſoon after Chriſtmas, ſeemed winter-proud. The ſoil was a looſe loam, and I had laid on plenty of dung. In the beginning of February, I turned about ſixty ſheep into the field, and fed it down; but the weather coming in milder than I expected, the weeds produced by the dung got ſo much a-head of the wheat, that the crop was a very poor one—not more than nineteen buſhels per acre.

I had another field of wheat, which was poor land, and being a turnip-fallow, was clean, and had not been manured. In February, I obſerved the plants to be ſmall, and to ſtand thin, and therefore turned in ſome ſheep, thinking it would cauſe the plants to throw out more ſide ſtems. The knot of the plants not being much above ground, there was no danger in that reſpect: the experiment ſucceeded, and I reaped near four quarters per acre.

From the cloſeſt obſervation, I find that wheat ought not to be fed down with ſheep, unleſs it be very rank in January; and that ſuch only ſhould be fed as was ſown early on land that is neither rich with dung nor weedy.

After it is fed, if the land be clean, a top-dreſſing of ſoot, aſhes, malt-duſt, &c. will greatly cheriſh the crop. I have experienced this in many inſtances, and can ſafely recommend the practice.

I am, &c.

P. W.

Jan. 24, 1779.

ARTICLE XVI.

Method of making Ponds in dry Countries, for Watering Sheep and Cattle.

[Communicated by a Gentleman near Beverly.]

MARK out a circular piece of ground, whoſe diameter is twenty yards, (more or leſs) and dig out one foot of earth, ſo as to leave the ſides perpendicular that depth. Then begin to form it in the ſhape of a wooden milk bowl, till the perpendicular depth in the centre be four feet and a half or five feet. On the bottom and ſides ſpread lime, finely powdered, two or three inches thick. On this lime lay well-tempered clay, ſix or ſeven inches thick. This clay, when laid on, muſt be well worked with circular beaters of a foot diameter and three inches thick, firſt uſing the outſide edge of the beater, which will indent the clay, then uſe the flat ſide, ſo as to leave it with a ſmooth ſurface. Upon the clay thus prepared, lay gravel or chalkſtone ſix inches thick. The gravel ſhould have both the finer and coarſer parts ſcreened from it. No more clay ſhould be prepared for the gravel than can be laid and covered the ſame day, as heat or froſt will be equally apt to catch it, which muſt be particularly guarded againſt, as it would occaſion the pond to loſe its water. After the gravel is laid in, nothing more is neceſſary.

A piece of ground ſhould be choſen for this purpoſe, to which there is a deſcent from all ſides, if it can be found in a proper ſituation.

Winter, or early in the ſpring, are the beſt ſeaſons for making theſe ponds or reſervoirs.

Lay each material of equal thickneſs from the centre to the edges of the pond.

If lime can be made fine enough without the uſe of water, ſo much the better: if not, uſe as little water as poſſible.—The clay ſhould have no more water than will ſerve to make it work kindly.

In this manner ponds may be made of any ſize, the diameter and depth being kept nearly in the ſame proportion as above-directed.

After I left Bath the laſt ſummer, and before the end of the long drought, I ſaw in a field one of theſe ponds nearly two-thirds full of water, although many cattle, ſheep, and horſes, had grazed there ſince the beginning of May.

Jan. 27, 1779. I am, &c.

ARTICLE XVII.

Experiments on Plants eaten or rejected by Cattle, Sheep, and Hogs, recommended.

GENTLEMEN,

EVER ſince you did me the honour of electing me a correſpondent member of your Society, I have wiſhed to contribute to its ſucceſs, by ſending ſomething that might prove uſeful in promoting the objects of your undertaking.

The uſe of botanic ſcience has been principally reſtricted to medicine, but it certainly has a natural and inſeparable connection with agriculture; ſome of the moſt important branches of which depend on the knowledge of it, particularly that which reſpects the feeding of cattle.

That Agriculture has not been ſtudied, or encouraged in proportion to its great importance, or advanced with equal rapidity as divers other arts or branches of knowledge, is a fact generally admitted.

From an indubitable conviction of this truth, we may date the origin of thoſe public inſtitutions for its ſupport and improvement which reflect honour on our age and nation.

The commendable ſpirit which appears in the Society inſtituted at Bath, furniſhes encouragement to hope that agriculture will receive much additional improvement in your counties; and as a well-wiſher to the undertaking, I beg leave to throw a few remarks before you on a ſubject not unworthy your attention.

It is well known that graſſes furniſh the principal food of our cattle; but among the natural claſſes of plants, there are many, of the leguminous tribe eſpecially, on which they feed with avidity.

Numerous inſtances, however, occur of one claſs of animals feeding eagerly on thoſe plants which others refuſe to touch. Plants, that are noxious and even poiſonous to ſome animals, are freely eaten by others without the leaſt inconvenience.—Hence it ſeems that there is a peculiar ſtructure in the veſſels of each ſpecies of beaſts, to which only the particles of different vegetables are reſpectively adapted. But there has not, to my knowledge, been any regular courſe of experiments made in England for aſcertaining preciſely the ſeveral ſpecies of plants thus eaten or rejected, or a regular liſt formed and publiſhed of thoſe that are noxious. Such a courſe of experiments is greatly wanted, and would doubtleſs be productive of much benefit to the public.

The celebrated Linnæus ſuperintended a great attempt of this kind in Sweden many years ſince, the reſult of which may be ſeen in the ſecond volume of Amænitates Academicæ, and is, I think, highly deſerving your attention.

It was in his Dalekarlian Journey that Linnæus conceived the firſt deſign of this great work. In that tour he found that his horſes left untouched, among other plants, the following: Meadow-ſweet, great wild valerian, lilly of the valley, angelica, roſe-bay willow, marſh cinquefoil, mountain and globe crowfoot, craneſbill, yellow wolfsbane, and ſeveral ſhrubs. Soon after his return, he and ſome of his pupils ſet about the work. Above two thouſand experiments were made on horned cattle, ſheep, horſes, hogs, and goats, with the ſole view of determining what kinds of vegetables thoſe ſeveral animals would eat or reject.

Theſe experiments being made with great care and accuracy, the reſult of them muſt on the whole be true and concluſive, as it has a real foundation in that unerring law of inſtinct, eſtabliſhed by the God of nature in the whole brute creation.

As theſe experiments were made on the indigenous plants of Sweden, they can only be deciſive here with reſpect to plants common to both countries; but as they take in the greater part of Engliſh plants, they would greatly facilitate an attempt of the ſame kind in this kingdom.

Three-fourths of the plants growing with us are the ſame as thoſe in Sweden on which experiments have been made. One fourth, only, remains to make new experiments upon. The undertaking would, therefore, not be ſo great or difficult to accompliſh as at the firſt view it may appear to be. The country round Bath, conſiſting of great variety of ſoil and ſurface, is particularly favourable for ſuch a work. Fenny ground and the ſea coaſt are not too remote to be viſited on the occaſion.

The advantages ariſing from this courſe of experiments being rendered complete, would be important and laſting. Poiſonous and noxious plants might be eradicated. The farmer would know with certainty what to cultivate and what to reject. Fen lands might be rendered valuable by the introduction of plants ſuited to the ſoil. By improving the produce of paſture land, our hay would be finer and better; and in proportion as the food of cattle is purely what inſtinct points out to them, their fleſh muſt be finer, and better adapted to human food, than when ſupplied with a mixture of juices of an unfriendly or noxious quality.

I am, &c.

X. Y. Z.

ARTICLE XVIII.

On the Bulk and Increaſe in Growth of ſome remarkable Timber Trees.

GENTLEMEN,

I Herewith ſend you incloſed a letter which I lately received from a moſt worthy and ingenious gentleman of this county, whoſe accuracy and fidelity cannot be doubted; the ſubject of it is both curious and entertaining, whilſt it will at the ſame time afford an opportunity of drawing from it concluſions the moſt uſeful and intereſting to the public. You will perceive, that I am permitted by my friend to communicate it to your truly patriotic Society, whoſe condeſcenſion in having honoured me with the title of a Member of it, as it claims every mark of reſpect, and every attention I can poſſibly pay to their views and inclinations, ſo it would have left me without excuſe had I omitted adding this valuable performance to their collection, which, will, I preſume, be enriched by it.

I am, with particular reſpect, your's, &c.

Hethel, near Norwich,
Oct. 11, 1779.

THOMAS BEEVOR.

'Dear Sir, *Stratton, Oct.* 1, 1779.

'IN compliance with your requeſt, I here ſend you the meaſures of ſome of the largeſt trees, taken by myſelf, in ſeveral rambles about the kingdom. But although I have been in parts of every county of England and Wales, perhaps larger than theſe may have eſcaped my ſearch; as I never heard of the Demary oak by Blandford, until I read Mr. Hutchinſon's account of it in his hiſtory of Dorſetſhire. The largeſt oak I have ſeen is that at Cowthorp, or Coltſthorp, near Wetherby in Yorkſhire, of which the ingenious Dr. Hunter gives a plate in his edition of Evelyn's Silva. The Doctor calls this tree 48 feet circumference at 3 feet from the ground; and I found it in 1768, at 4 feet, 40 f. 6 in.; and at 5 feet, 36 f. 6 in.; and at 6 feet, 32 f. 1 in.—Here to ſave repetition, 5 feet is the height I always meaſure at, as eaſier to ſee the level of the ſtring, and alſo being clearer of the ſwellings of the roots.

'In 1759, the Oak in Holt Foreſt, near Bentley, was, at 7 feet, 34 f. There is a large excreſcence at 5 and 6 feet, that would render the meaſure unfair. In 1778, this tree was increaſed half an inch, in 19 years. It does not appear to be hollow, but, by the trifling increaſe, I conclude it not ſound.

‘ The Fairtop Oak in Epping Foreſt, ſeeming ſound in 1754, and the Earl of Thanet’s hollow Oak, in Whinfield-park in Weſtmoreland, in 1765, were both 31 f. 9 in.

‘ The handſomeſt Oak I ever ſaw was in the Earl of Powis’s noble park by Ludlow, in 1757, though it was but 16 f. 3 in. But it ran quite ſtrait, and clear of arms, I believe, near full 60 feet, and had a large and fine head.

‘ In Benel church-yard, 3 miles north of Dunbarton, in Scotland, in 1768, a very flouriſhing Aſh, 16 f. 9 in.

‘ In 1754, a fine Wych Elm by Bradley church, in Suffolk, 25 f. 5½ in.; in 1767, this tree was 26 feet 3 in. Increaſed 9½ in. in 13 years.

‘ I have a hollow Wych Elm by Stratton church, at 4 feet, 29 f. 6 in.; and I had, in 1760, in my old park in Hevingham, a headed Alder at 4 feet, 16 f. 2¾ inches.

‘ In 1755, your Hawthorn, by Hethel church, was, at 4 feet, 9 f. 1¼ in. and one arm extended above 7 yards.

‘ The talleſt trees that I have ſeen were Spruce and Silver Firs, in the vallies in Switzerland. I ſaw ſeveral firs in the dock-yard in Venice above 40 yards long; and one of 39 yards was 18 inches diameter at the ſmall end. I was told they came from Switzerland.

‘ In Lord Petre’s old park, at Writtle in Eſſex, in 1764, I found a Hornbeam above 12 feet; and the old Cheſnut, (very hollow) at 3½ feet, the leaſt part 42 f. 5 in.; at 5 feet, 46 f. 1 in.; and at 6 feet, 49 f. 5⅞ inches

‘ In 1759, the cheſnut in Lord Ducie’s garden, at Tortworth in Gloceſterſhire, was at 6 feet, (the loweſt I could meaſure it, as the garden-wall joins to the tree on two ſides) 46 f. 6 in.; it did not appear hollow, but had very few and ſmall boughs: as I took the meaſure in a heavy rain, and did not meaſure the ſtring till after I returned to the inn, I cannot ſo well anſwer for this, as the other meaſures.

‘ I omit beech, birch, maple, abele, &c. as I have heard of much larger trees of thoſe ſorts than I have ſeen.

‘ Perhaps an account of the annual increaſe of ſome trees will not be foreign to your purpoſe.—

You know it is difficult to diſcover the age of old trees, as very few old planters kept regiſters of their plantations.

'I have ſeen a memorandum of a former Rector of Hevingham, wherein is written, that "in 1610 "he planted two cheſnuts by his church porch;" the largeſt was, laſt autumn 1778, 14 f. 8½ inches, or 176½ inches in 168 years. Suppoſing the tree to have been 9½ inches when planted, you ſee it increaſed an inch yearly.—And I have a deed between an anceſtor of mine, as Lord of the manor of Stratton, and his copyhold tenants, upon his incloſing ſome of the waſte, wherein the abuttal to the weſt is upon the road leading from Hevingham to Norwich, which you know cannot be miſtaken: the date is 1580, and the largeſt oak on that bank, at 4 feet, was, laſt autumn 1778, 16 f. 3½ inches, or 195½ inches in 198 years.

'Now, from the increaſe of the Bentley oak, and the two laſt-named trees, I conclude the Tortworth cheſnut is not leſs than 1100 years old; perhaps it may be much older.

'I offer you the following calculation for your amuſement; from its vaſt bulk, you muſt conclude it was a very healthful tree. Suppoſe it increaſed an inch and quarter yearly the firſt century, an inch the ſecond, three quarters the third, half an inch the fourth, one third the fifth, and thirty inches each century for the ſecond 500 years, and a little leſs than a quarter for the eleventh century; the account will ſtand thus:

	Inches.
The firſt century, at an inch and quarter, --	125
Second ditto at one inch - - - - - - -	100
Third ditto at three quarters - - -	75
Fourth ditto at half an inch - - -	50
Fifth ditto at one third of an inch - -	33⅓
Second 500 years at 30 inches per century -	150
Eleventh century at 24⅔ inches - -	24⅔

46 feet and a half; or 558 i.

'There is a tradition, that this tree was called the great cheſnut in King John's time; and ſuppoſing it grew in this proportion, it was 540 years old when he came to the throne, and eleven yards in circumference.

'Sir R. Atkins, in his hiſtory of Gloceſterſhire, (p. 413) ſays, 'by tradition this tree was growing in 'King John's reign, and is 19 yards in compaſs;' and I believe it is at leaſt ſo large near the earth.

Now, although I have ſufficient proof of young trees increaſing much more than my ſuppoſed growth of this cheſnut, yet perhaps I have allowed ſufficiently for that tree, as it grows on a ſtiff clay; which, though perhaps it may in the end produce the largeſt trees, yet I believe moſt trees will grow faſter in lighter ſoils.

I planted an oak in 1720, which was laſt autumn 7 f. 9 in.; I do not pretend to remember the ſize when planted; but in Autumn 1742, it was 2 f. 11¼; *i. e.* 57¾ in. increaſe in 36 years, *i. e.* above an inch and a half yearly. But this oak was taken from very poor land, to a tolerable light ſoil, and ſtands ſingle; and perhaps the growth was helped by digging a large circle round it in ſeveral winters, and in other years having that circle covered with greaſy pond mud; and in ſome dry ſeaſons, I waſhed the ſtem: and the advantage of waſhing I experienced in 1775, greatly to my ſatisfaction. You may ſee the full account in my letter to the Biſhop of Bath and Wells, in the 67th volume of the Philoſ. Tranſ. in 1777. But ſuppoſing theſe endeavours did not help the growth of this oak, yet I apprehend it will not be 225 inches in circumference when 200 years old. For though the Hevingham cheſnut is a healthful tree, it has increaſed but 25 inches and a half in the laſt 36 years, (viz. from my firſt meaſuring it) which ſhews, if it had not gained more in its younger ſtate, it would have taken 250 years to make its preſent bulk of 176 inches: and my oak of 198 years old has, from 1760, increaſed only 12¾ inches, in 18 years: which proportion would take 275 years to make 195 inches: and the oak by Bentley, according to the laſt 19 years increaſe, would take above 15500 years to make 408 inches, the preſent circumference of the tree.

'If you think any of theſe meaſures will afford entertainment to the Society at Bath, you have my leave to offer this letter to them; which will ſhew at leaſt that I have pleaſure in obeying your commands.

'I am, with great reſpect,
'Your moſt humble
'and obedient ſervant,
'R. MARSHAM.'

'*Thomas Beevor, Eſq.*'

'*P. S.* I have put dates to all the meaſures, that if your curioſity ſhould lead you to meaſure any of the trees, you may know what progreſs they make in a certain time.'

ARTICLE XIX.

Mode of Farming purſued by a Member of the Bath Agriculture Society.

GENTLEMEN,

WHEN I took my farm, which conſiſted of 115 acres, I found the arable undone by improper tillage, and the meadows worn out for want of manure, I will deſcribe the farm as nearly as I can. The ſoil in general is compoſed differently, of mould, ſand, gravel, and here and there clay. The farmer I ſucceeded was a ſloven in the abſtract, and ſo bad a ploughman, that he never croſs-ploughed his land through incapability. It was an opinion of mine, that the ſooner I got my land in order the better; and that the firſt expence would be lighteſt.

No. I. was a field lying near the houſe, tolerably clean and not wanting dung, found in a barley-ſtuble without clover; this I planted with peaſe, and giving it a dreſſing of dung, I had a good crop. This was the year 1775, and the ſucceeding year I had a good crop of wheat, not indeed equal to my improved land, but little leſs than three quarters per acre. The year following the wheat, I ſummer-fallowed and turniped it,—the courſe I afterwards invariably purſued. The ſoil was gravelly with ſome depth of mould.

No. II. was a coarſe unkind piece of land, of a ſoil neither clayey or gravelly, but ſomething between both, and which my men called chiſley. This had been cropped with oats, and a very indifferent crop indeed; I dunged it in the ſpring, and planted potatoes on half, and ſowed vetches on the other half; the crops of both were equal to my expectation, but the greateſt advantage was the benefit the land received from the potatoes, by which it was mellowed ſo ſurprizingly, that I was reſolved, contrary to my firſt intention, to ſow the field with wheat, which yielded me only four ſacks per acre.

No. III. had borne wheat, but the ſtubble was ploughed up for turnips, which afforded a little ſheep-feed, though not worth the expence. This was a good piece of land, tolerably clean, but wanted reſt. The ſpring turning out favourable, I altered my intention, which was to have fallowed it and ſown it with turnips, and therefore ſowed it with barley at five ploughings; with the barley, three buſhels per acre, I ſowed a buſhel of rye-graſs, 6 lb. of Dutch clover, and 6 lb. of black graſs, without any broad clover; not that I know it to be a good method, but that I wiſhed to lay it down for ſome years, being handy for feeding. The barley yielded me about $3\frac{1}{2}$ quarters per acre. As ſoon as the barley was off, I dreſſed this field with chalk and compoſt of dung and earth ſeparately, the chalk about eight waggon loads per acre, and the compoſt about twelve cart loads; I had the year following a moſt excellent ſwarth of graſs.

No. IV. had been cropped with beans. This I ſowed with wheat at three ploughings. After the wheat I had it tilled and dunged for ſummer vetches, of which I had a moſt noble crop. When the vetches were off, I had it ploughed three times and ſowed with wheat.

No. V. a clover-lay, I ſowed with wheat at one ploughing; it was very foul, and produced only about three ſacks per acre. The year following it was turniped.

No. VI. was a rowetty coarſe piece of paſture, that had not been ploughed for ſome years. Here I ſowed black oats; the produce was three quarters and half per acre; the next year it was ſummer-fallowed and ſown with turnips.

No. VII. a mixture of ſandy and gravelly ſoil, was from a wheat ſtubble ſummer-fallowed, well dunged, and ſown with turnips, as was alſo

No. VIII. which was drained and chalked. The turnips on both were remarkably good. No. VII. was the next year turned into a garden, and bore very large crops of potatoes, Windſor beans, carrots, cabbages, and parſnips, but a very few onions, which I apprehend was as much owing to want of care as as any thing elſe; among the beans I tried ſome turnips, but they were not good, being in general worm-eaten, and ſticky or ſtringy.

No. IX. part of which was an orchard, was alſo in graſs: this I dunged well, and planted with beans, thinking to ſummer-fallow for turnips the next year, but in this I altered my mind, and ſowed winter vetches, which anſwered moſt incomparably well cut for horſes, and for feeding the ſows and pigs. The beans produced rather more than four quarters per acre: they were hoed three times, which did them great good, but deſtroyed no couch. After the vetches, I ſummer-fallowed for turnips.

No. X. was a meadow which had been ſtrangely neglected; a brook ran through it, and frequently overflowing, had given nurture to abundance of ruſhes. I ordered water furrows to be cut, ſufficient to carry off all wet, and ſpread over the whole meadow wood aſhes brought dry from a lime and brick kiln to the quantity of forty buſhels per acre; I kept it cloſe fed that ſummer inſtead of mowing it: in the winter a little before Chriſtmas, I dreſſed it well with dung, and the produce of graſs anſwered well the expence; I cut full two tons per acre of excellent graſs free from ruſhes.

My aim was to bring all my land as ſoon as poſſible to bear turnips, which I conſider as the foundation of good huſbandry, in the following order: Turnips, barley, clover, and wheat, and this ſucceſſion invariable. After I got my land in order, for which I ſpared no expence, my crop was large, five quarters of barley, and from eight to ten ſacks of wheat in general. I made it a rule always to manure my clover as ſoon after the barley was off as I could; and this dreſſing was of the beſt materials I could collect, with ſtable dung if I could get it. But to proceed in my ſtory with the reſt of my farm; for I have only yet mentioned fifty-two acres.

No. XI. had borne a ſecond crop of oats ſelf-ſown: this, to be ſure, muſt be ſummer-fallowed. I had it ploughed ſix times, and manured with 12 good waggon-loads of ſtable dung well rotted to an acre, but being ſtoney land, I ſowed it with wheat inſtead of turnips, and yet the produce was not more than three quarters per acre. I think, from the experience I have had, that the dung is not of very eſſential ſervice when applied for a crop of corn, but to turnips, pulſe, graſs, or vetches, it is of the utmoſt importance; and after theſe crops, will wonderfully aſſiſt the corn crops, as barley after turnips, and wheat after peaſe, vetches, or clover.

No. XII. was a clover lay, which, not having been dreſſed for graſs, I manured for wheat, but the produce was very ſmall, not more than three ſacks and a half to an acre; this was turniped after the wheat.

No. XIII. XIV. and XV. I ſummer-fallowed, well dunged, and ſowed with turnips; theſe were a light lively land, capable of being worked after a month's rain, and yet not burning. The turnips were remarkably good, the barley five quarters per acre. As ſoon as the barley was off, the clover was dunged; and the produce of the clover, at two cuttings, three tons and a half per acre. The wheat was ſown at one ploughing, two buſhels per acre, and the produce full nine ſacks and two buſhels upon the average.

No. XVI. was a barley ſtubble, with a good plant of clover. I dreſſed the clover well, and mowed near two tons at two crops, and ſowed the land with wheat. In the ſpring the wheat was very thin and worm-eaten. I ſowed ſome ſoot over the parts that were injured, which ſtopped the further progreſs of the worm; and the land being in good heart, from the dung I had put on the clover, the wheat tillered amazingly, and produced, totally unexpected by me, three quarters and a half per acre. However a ſpring cleaning of foul land for barley may anſwer for that crop and the crop of graſs, yet when the land comes to be ſown with wheat afterwards, the couch will almoſt get the better of the wheat, and inevitably do it conſiderable damage; of this I had an inſtance in No. XVII. which was a clover-ſtubble left after barley, where great pains had been taken to clean the land and rid it of couch; but the land, when turned up and ſown with wheat, was ſo foul, that the crop hardly paid the expences, and I repented

I did not ſummer-fallow and ſow it with turnips out of the clover.

No. XVIII. I ſowed after peaſe with white oats and clover, but the clover did not take kindly; and as the oats were got off pretty ſoon, my man adviſed me to ſow it with wheat; accordingly I had it ploughed four times, and got out all the clutter of couch, weeds, &c. that we could; after that I dunged and ſowed it with wheat; the crop was not very much amiſs, tho' not equal to what I expected, and I might better have turnipped it at once.

No. XIX. was wheat ſtubble, which I ſummer-fallowed and ſowed with turnips.

Thus I have given the method of farming I purſued in Berkſhire without impoſition or exaggeration.

No.	Soil.	Acres.	1775.	1776.	1777.	1778.
1.	Gravelly mould	6	Peaſe	Wheat	Turnips	Barley
2.	Gravel and Clay,	6	Potatoes & Vetch	Wheat	Turnips	Barley
3.	Deep loamy mould	4	Barley	Graſs	Ditto	Ditto
4.	Stiff ſoil	5	Wheat	Vetches	Wheat	Turnips
5.	Mellow loam	4	Wheat	Turnips	Barley	Clover
6.	Sandy loam	4	Oats	Turnips	Barley	Clover
7.	Sandy and gravelly ſoil	4	Turnips	Potatoes, &c.	Wheat	Turnips
8.	Ditto	6	Turnips	Barley	Graſs	Ditto
9.	Mellow loam	3	Beans	Vetches	Turnips	Barley
10.	Meadow	10				
11.	Strong clayey ſoil	5	Sum. fal.	Wheat	Beans	Turnips
12.	Stiff clayey gravel	5	Wheat	Turnips	Barley	Graſs

No.	Soil.	Acres.	1775.	1776.	1777.	1778.
13, 14, 15,	Sandy loam	12	Turnips	Barley	Clover	Wheat
16.	Ditto	4	Wheat	Turnips	Barley	Clover
17.	Sandy and gravelly loam	5	Wheat	Turnips	Barley	Clover
18.	Gravelly ſoil	6	Wh. Oats	Wheat	Turnips	Barley
19.	Sandy & gravelly loam	10	Turnips	Barley	Clover	Wheat
20, 21.	Meadow	16				

By this mode of farming, I had only nine acres of wheat in the year 1777; a conſiderable leſs quantity than any other year. But in general, I wiſhed to have the farm as equally divided as poſſible into the ſeveral crops of turnips, beans, clover, and wheat,

T. L.

ARTICLE XX.

On the beſt Method of raiſing Elms for Fences; manuring Fallows for Wheat; and preventing the ravages of the Fly on young Turnips.

GENTLEMEN,

THE beſt method of raiſing elms quick is the following: When you fell elm timber, in the ſpring, ſow the chips made in trimming or hewing them green, on a piece of ground newly ploughed, as you would corn, and harrow them in. Every chip which has an eye, or bud-knot, or ſome bark on it, will immediately ſhoot like the cuttings of potatoes; and the plants thus raiſed having no tap-roots, but ſhooting their fibres horizontally in the richeſt part of the ſoil, will be more vigorous, and may be more ſafely and eaſily tranſplanted, than when raiſed from ſeeds or in any other method. For elm fences, the plants thus raiſed have greatly the advantage of others, as five or ſix, and frequently a greater number of ſtems will ariſe from the ſame chip; and ſuch plants, when cut down within three inches of the ground, will multiply their ſide ſhoots in proportion, and make a hedge thicker, without running to naked wood, than by any other method yet practiſed. If kept clipt for 3 or 4 years, they will be almoſt impenetrable.

Stable-yard dung is commonly uſed as a manure on land intended to be ſown with wheat; but let it be obſerved, that this dung is more productive of weeds than any other manure. A crop of wheat cannot be kept too clean; hence much trouble and expence are occaſioned by ſo injudicious a proceſs. To remedy or rather to prevent this inconvenience, inſtead of ſowing a newly dunged fallow with wheat, ſow it firſt with white oats; theſe will take off the rankneſs of the dung, deſtroy numberleſs weeds, and leave the land in excellent order for wheat the following autumn. In ſhort, it is nearly equal to a turnip-fallow.

The ravages of the fly on turnips have frequently occaſioned great loſs to the farmer, and many remedies have been propoſed, moſt of which have not anſwered—perhaps the following may be more efficacious; The boughs of the common elder tree, fixed in a gate, and drawn gently over young turnips when they firſt appear, will prove an excellent preſervative from the fly; and if the leaves of the ſaid boughs be a little bruiſed, and fumigated with the ſmoke of burnt tobacco mixed with a ſmall quantity of aſſafœtida, it will deſtroy thoſe inſects effectually. It will alſo be of great uſe to bruſh the leaves and branches of your wall fruit trees with elder boughs thus prepared. Nothing is ſo diſagreeable to inſects as a mixture of tobacco and aſſafœtida fumigations. It will kill them inſtantly wherever applied.

I live at too great a diſtance to attend your meetings, but wiſh to promote your laudable deſigns as far as I am able.

I am, &c.

Taunton-Dean, July 4, 1778.

To the above letter, we think it not improper to ſubjoin an extract from another, ſince received from a gentleman at Exeter; and recommend the experiments mentioned in both as a remedy for the fly on turnips.

‘ After the land is ploughed for turnips, and ‘ when the ſeed is harrowing in, let ſome large ‘ branches of common elder, with the berries on, ‘ be fixed in the harrow, ſo as to rub on the ground. ‘ The friction of the leaves and berries will leave ‘ ſo ſtrong (and to theſe inſects, ſo diſagreeable) a ‘ taint or odour on the ſoil, as will probably pre- ‘ vent their alighting on ſo unpleaſing a ſpot, or ‘ make them ſpeedily leave it, if they can be ſup- ‘ poſed to have been there before the ſeed was ‘ ſown. The effects of the effluvia of elder are ‘ much greater, and more laſting, with reſpect to ‘ thoſe inſects, than would at firſt be imagined, or ‘ even credited by the bulk of mankind.’

Article XXI.

On a peculiar ſpecies of Graſs found at Orcheſton, on Saliſbury-Plains, Wiltſhire.

[By a Gentleman of Dorcheſter.]

Gentlemen,

I AM favoured with your Secretary’s obliging letter, in reply to mine reſpecting the graſs-ſeed; and it gives me ſatisfaction that I can herewith ſend you a ſpecimen in the blade for your inſpection. This graſs is found at Orcheſton St. Mary, about nine miles from Saliſbury, in a meadow belonging to Lord Rivers, now in the occupation of Farmer Hayward. This meadow, being ſituated on a ſmall brook, is frequently overflowed, and ſometimes continues ſo a great part of the winter. It bears the greateſt burthen in a wet ſeaſon.

When I was there, it was too early in the ſpring to make any particular obſervation on the blade, but the Farmer's account is as follows, viz. ‘ that it generally grows to the height of about eighteen inches, and then falls and runs along the ground in knots, to the length of ſixteen or eighteen feet, but that he has known inſtances of its running to the length of twenty-five feet.’

The meadow contains about two acres and a half. It is mowed twice in a ſeaſon, and the average quantity is generally about twelve loads (tons) of hay the firſt mowing, and ſix the ſecond; though ſometimes conſiderably more. The tythe of the meadow has been compounded for at nine pounds a year.*

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* This account appeared to us ſo ſingular, and the crop of graſs ſo very extraordinary, that our Secretary went to Orcheſton, to examine

The graſs is of a ſweet nature; all cattle, and even pigs, eat it very eagerly. When made into hay, it is excellent, and improves beaſts greatly. The farmer ſays his horſes will eat it in preference to corn mixed with chaff, when both are ſet before them together.

amine more particularly into it. The Farmer, and divers other perſons in the village, confirmed the account contained in this letter, of its amazing produce in ſummers when the meadow had been overflowed in the preceding winter and ſpring; but when the winter had been dry, and the meadow not overflowed, the crop of graſs was not near ſo large. There did not appear to be any thing peculiar in the ſoil; nor were the other plants or weeds growing on it more luxuriant than in many other ſimilar ſituations. Some of this graſs was ſent to the Society at Norwich; ſome ingenious members of which inform us, that they think it is a ſpecies of the Agroſtis Polymorpha, mentioned by Hudſon in his *Flora Anglica*, of which there are ſeveral varieties.

Camden mentions, in his *Britannia*, a graſs growing near the place where this is found, which he calls *trailing Dog's-graſs*, and ſays, that "hogs were fed with it."

From all the enquiry made, we have not found this ſpecies of graſs growing in any other part of the kingdom; hence it is poſſible that there may be ſomething in the ſoil of this meadow peculiarly favourable to its growth.

We ſhall not, however, determine on this point, but recommend trials to be made of propagating it, by ſowing the ſeed in other places, ſubject to be overflowed in the ſame manner. If it can be propagated generally, it muſt turn out the moſt profitable to the farmer of any graſs yet diſcovered, and be of great benfit to the community.

Should the Society wiſh for further information or aſſiſtance, I ſhall be happy in doing every thing in my power to promote their views.

ARTICLE XXII.

Some Obſervations on Thiſtles *as injurious in Agriculture, more particularly the* Seratula Arvenſis *of* Linnæus.

[By W. CURTIS, Author of the *Flora Londinenſis.*]

GENTLEMEN,

WHILE ſome of your correſpondents are laudably engaged in enriching agriculture, by diſcovering and promoting the cultivation of new plants, permit one whom you have been pleaſed to elect an honorary member of your Society, to lay before you a few obſervations on ſome of the plants which are more particularly noxious to the farmer. Should they be conſidered as contributing to advance even in the ſmalleſt degree the deſign of your inſtitution, he may be again excited to trouble you on other ſubjects, as information may ariſe from a cultivation of moſt of the Britiſh plants on a ſmall ſcale.

There are no plants over which the œconomical farmer ought to keep a more watchful eye than the thiſtle tribe. He is ſenſible that they are not only uſeleſs, as reſiſting the bite of moſt animals, the hardy aſs excepted, but that they occupy much ground; and being furniſhed with downy ſeeds, are capable of being multiplied to almoſt any diſtance. Hence in many parts of the kingdom, the farmers whoſe lands are contiguous unite in preventing the increaſe, by cutting them down before they ſeed; but this operation, though deſtructive to ſome ſpecies, will only palliate the bad effects of others.

To be acquainted with the qualities of each kind, we muſt obſerve them with much attention, and view them in a botanical and philoſophical light: this alone will enable us to judge with certainty how far and by what means their deſtruction may be effected.

The Engliſh Thiſtles meriting notice, as more or leſs noxious, are,

1. The Carduus Lanceolatus, or Spear Thiſtle
2. Carduus Nutans, — Muſk Thiſtle
3. Carduus Paluſtris, — Marſh Thiſtle

4. Carduus Marianus, or Milk Thiſtle
5. Carduus Acanthoides, — Welted Thiſtle
6. Carduus Criſpus, — Curled Thiſtle
7. Onoperdum Acanthium, — Cotton Thiſtle
8. Seratula Arvenſis, —*Curſed Thiſtle

The *Spear Thiſtle* is a large ſtrong plant, about four feet high, the extremity of each leaf running out into a long point; its heads are large, and it grows very commonly by the ſides of roads, near dunghills, and not unfrequently in fields and paſtures.

The *Muſk Thiſtle* grows to the height of 2 or 3 feet, the heads hang down, and the flowers ſmell ſomewhat like Muſk; it is often found occupying whole fields, particularly on chalky or barren land.

The *Marſh Thiſtle* is very tall and prickly; its heads are numerous, ſmall and of a red colour; it grows abundantly in wet meadows, alſo in woods.

The *Milk Thiſtle* has very large leaves, which are moſt commonly beautifully marbled with white. Near London it appears frequently on banks by road ſides; in which ſituation we alſo meet with

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* The term *Way Thiſtle*, by which this plant has uſually been diſtinguiſhed, is by no means ſufficiently expreſſive of it. The preſent term may, perhaps, be thought too harſh; but if any plant deſerve to have a mark ſet upon it, it is certainly this.

The *Curled* and *Welted Thiſtle.* Theſe three ſeldom intrude into fields or paſtures.

The *Cotton Thiſtle* is diſtinguiſhed by its ſize, (being perhaps the largeſt of the Britiſh herbaceous plants) and its white woolly leaves. It grows in the ſame ſituation as the three laſt-mentioned.

The *Curſed Thiſtle* is more general in its growth than any of the others, being found not only by the ſides of roads univerſally, but alſo in arable land, and is not uncommon in meadows, even in ſuch as are yearly mown. It is remarkably prickly, grows about three feet high; its heads are ſmall, the flowers purple, and frequently white. The ſcales of the heads are ſmooth, and may in a particular manner be diſtinguiſhed from all the others before-mentioned, by having a perennial root about the ſize of a gooſe-quill, which runs deep into the earth, and afterwards creeps along horizontally.

Of theſe thiſtles, all except the laſt are either *annual* or *biennial*; that is, remain in the ground not more than one or two years, unleſs renewed by ſeed. The laſt having a perennial root, continues in the earth, increaſing, and throwing up new ſhoots every year.

Hence it will appear obvious, that if the firſt ſeven ſpecies of thiſtles are cut down before they perfect their ſeed, the ground will be entirely cleared of them; and that the laſt mentioned can no otherwiſe be deſtroyed, than by rooting it out, a proceſs which the following experiments will ſorrowfully convince the rural œconomiſt to be impracticable in large fields, and ſcarce to be performed even in an incloſed garden.

EXPERIMENT FIRST.

To aſcertain the effects of mowing the Seratula Arvenſis.

The Hon. Daines Barrington, who is ever anxious to promote uſeful enquiries, deſired me to try whether this kind of thiſtle could not be deſtroyed by mowing. A ſmall patch of them, about two feet ſquare, was accordingly planted in a good garden, in the year 1777. In the courſe of the ſummer they were mown three ſeveral times, but without any other good effect than that of preventing their ſeeding; for inſtead of being deſtroyed, the next ſpring they came up extremely vigorous, not only on the bed where they were firſt planted, but all around it to the diſtance of ſix feet.

EXPERIMENT SECOND.

To aſcertain the annual Increaſe of the Root of the Seratula Arvenſis.

April 1, 1778, I planted in a garden a piece of the root of this thiſtle, about the ſize of a gooſe-quill, and 2 inches long, with a ſmall head of leaves, cut off from the main root, juſt as it was ſpringing out of the ground. By the 2d of November, 1778, this ſmall root had thrown out ſhoots, ſeveral of which had extended themſelves to the diſtance of eight feet; ſome had even thrown up leaves ſix feet from the original root. Moſt of theſe ſhoots which had thus far extended themſelves were about ſix inches under ground—others had penetrated to the depth of two feet and a half; the whole together, when dug up and waſhed from the earth, weighed four pounds.

In the ſpring of 1779, contrary to my expectation, this thiſtle again made its appearance on and about the ſpot where the ſmall piece was originally planted. There were between fifty and ſixty young heads, which muſt have ſprung from thoſe roots, which had penetrated deeper than the gardener was aware of, although he was particularly careful in extracting them.

From theſe experiments it appears deducible, that no plants are more eaſily deſtroyed than the generality of thiſtles, or with more difficulty than this one; there being no ſoil, however poor, in which it will not vegetate, nor earth ſo ſtiff but it will penetrate; in proportion, however, as the ſoil is rich, will be its increaſe.

It were much to be wiſhed, that an inveſtigation of this evil had afforded a remedy: at preſent, none appears. It is, therefore, to be feared, that ſpudding or cutting them down cloſe to the ground, once or twice in the ſpring, is the only operation the farmer can perform to prevent their bad effects in deſtroying his crops on arable land, and rendering his paſtures unſeemly.

As nature in the preſervation of this plant ſeems to have exerted her greateſt powers, it is poſſible that in ſome future period, uſes may be diſcovered to which it has not yet been applied.

To the aſs it is the higheſt treat; and I have been credibly informed, that in ſome parts of Scotland, it is cut down as food for horſes.

It would be well, if a plant ſo noxious in ſome reſpects could be rendered beneficial in others.

I am, &c.

WM. CURTIS.

ARTICLE XXIII.

On a Diſeaſe the Norfolk Stock Lambs are liable to from eating ſelf-ſown Barley in Autumn.

[By a Norfolk Farmer.]

GENTLEMEN,

IN our open field-lands, where ſheep are moſtly kept, there are every ſummer large tracts of barley, in which, after harveſt is ended, and particularly when it proves a wet Michaelmas, a great quantity of ſelf-ſown barley comes up in October. As the ſheep then run at large, they are very fond of this crop, but it often proves fatal to them.

The cold dews in the latter end of October, and the fogs in November, generally hang in drops on the blade of this ſelf-ſown crop, longer than on the reſt of the herbage; and the plants themſelves being of a cold watery quality are thereby rendered ſtill more unwholeſome. After feeding on it for about a month or ſix weeks, the ſtock-lambs grow dull and heavy, rub themſelves more than uſual, loſe their appetite, and waſte till they die.

After they are once viſibly affected, removing ſeldom ſaves them. The fleſh of ſuch as are killed appears looſe and flabby. The viſcera is of a livid hue, and very watery; the liver is greeniſh, and full of ſmall knots or kernels; the blood is viſcid, with a watery ſediment, and very ſoon turns putrid. As ſoon as the ſymptoms appear, they are blooded below the eye: this, in the firſt ſtage of the diſorder, is ſometimes effectual; but no other remedy has yet been diſcovered.

The diſeaſe does not appear to be infectious; nor are either the ewes or wethers much ſubject to it.

I wiſh the Bath Society may be able to point out a remedy;—and am, &c.

ARTICLE XXIV.

Obſervations on the Mnyum Moſs.

GENTLEMEN,

IF the following hint is worthy the notice of your Society, it is much at their ſervice.

Wherever the mnyum moſs, the red rot, and the marſh pennywort grow, there the water is uncommonly cold, and perhaps of a poiſonous or mineral tinge. Grazing all low lands where ſuch plants grow, as above deſcribed, will occaſion the death of many ſheep, and cauſe ſome diſorders in larger cattle.

I am, &c.

W. B.

ARTICLE XXV.

On the ſuperior quality of Grain produced from SET *Wheat, to that ſown Broad-caſt.*

GENTLEMEN,

IN anſwer to your query, "Whether the *flour* of "*ſet* wheat is *whiter*, or in any other reſpect "preferable to that which is ſown broad-caſt?" I know of no comparative difference but what I conceive muſt neceſſarily ariſe from *fuller*, more *equal*, and *perfect corn*, than what is generally produced in the ordinary or broad-caſt mode: and as theſe circumſtances are, I believe, always attendant on *ſet* wheat, there is leſs neceſſity of *throwing* and *dreſſing*, as practiſed by the farmer, and *ſcreening*, as practiſed by the miller; in courſe, the ſhort anſwer will be, that *ſet* wheat will produce equally good flour, without the waſte and trouble that attend the other.

On lands where wheat is *ſet*, the crop is free from thoſe dwinged [ſhrivelled] diminutive grains that are ſo commonly found in even the beſt crops of that ſown broad-caſt: of courſe, it is ſpecifically heavier; and the proportion of flour exceeds the comparative difference of weight. Our farmers know this: they expect, and we * give a price exceeding that which is commonly given for the reputed beſt wheats that were ſown broad-caſt.

I find the gentlemen of the Bath Society are acquainted with our mode of ſetting wheat. Every farmer of induſtry and activity, who adopts this mode, will find the performance eaſy beyond his firſt apprehenſion; and feel himſelf repaid with an equal or greater quantity, intrinſically ſuperior to what ariſes from the common practice. But I think, from the careleſſneſs of droppers, three pecks of ſeed ought to be allowed to an acre.

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* This Gentleman is a Farmer, a Miller, and a Baker.

Before I conclude, it may not be improper to inform you of an experiment I am now making in planting horſe-beans. I had a piece of meadow-land, or rather wet waſte, almoſt conſtantly under water in the winter, and not unfrequently ſo in the ſummer. It produced little but ruſhes, and (in the agricultural ſenſe) other unprofitable aquatic plants. In February laſt, I opened, drained, and ſurrounded it with a ditch, the earth of which I threw into the hollow parts to render it level. It was then ploughed in the ſame manner as we plough the clover-lays for wheat, by turning the turf downwards. On this I ſet horſe-beans, and the promiſe of a crop is abundant; there being from eighteen to forty-eight pods generally on a plant; and the ruſhes ſeem to be eradicated.

In order to bring a conſiderable hollow in this field to a level, I had the ſurface pared off a piece of furze ground paſture, and laid upon it. On the ſpot ſo filled up, I expected the beſt crop; but, on the contrary, here the bloſſoms dropt off conſiderably, the plants had a blaſted appearance, and the produce was inconſiderable.

I am, &c.

Norwich, *Aug.* 15, 1779.

ARTICLE XXVI.

An Account of the Cultivation of Siberian Barley.

[Sent to the Norfolk Society by the *Rev. Mr. Howman*, of Bracon, in Norfolk; and tranſmitted to the Society at Bath by *Thomas Beevor*, Eſq. of Hethel-hall.]

GENTLEMEN,

IN conſequence of your having invited the members of the Society to communicate their experiments in any branch of huſbandry, I am excited to relate the reſult of one which I made laſt year, in order to form ſome judgment of the advantage of cultivating Siberian barley.

A ſmall incloſure, containing 3 acres, 1 rood, 2 perches, which had been under turnips the two preceding years, was ſown with common barley, excepting one ridge of land in the middle of it, containing 20 perches, which was ſown with Siberian barley the ſame day. The ſoil was very dry, and much inclining to a gravel.

The time of ſowing was the 28th of April 1774, and the ſtate of the experiment as follows:

	Seed per Acre.	Produce per Acre.	Weight per Buſhel.	Total weight per Acre.
	Buſhels.	Buſhels.	Pounds.	Pounds.
Common Barley,	3	36½	52	1898
Siberian Barley,	3	32	58	1856

Exceſs of meaſure in favour of the common barley, 4½ buſhels.
Exceſs of weight in favour of the common barley, 42 pounds.

A few particularities attended the growth of the Siberian barley, viz.

1. During the firſt three weeks after the corn came up, the Siberian was of a much deeper green, and had a much broader blade than the common barley; after that time the difference gradually diminiſhed.

2. The Siberian was in all its ſtages a fortnight forwarder than the common barley. It was mowed and houſed accordingly.

3. The ears of the Siberian were much ſhorter than thoſe of the common barley; being only from five to nine grains in length; whereas the ears of the common barley were from nine to thirteen.

From the firſt particular I had raiſed my expectations high in regard to the Siberian barley, and was conſequently much diſappointed at the appearance of the third. I then thought that the produce would be greatly deficient; but the ſize of the grains in a good meaſure prevented it.

The concluſion which I am tempted to draw from theſe two circumſtances is this, that the Siberian requires richer land than the common barley. In my land, there appeared to be ſufficient ſtrength to produce all that luxuriance of growth which ſeems natural to the plant while in the graſs, but not ſufficient to ſupport it in forming the ear. I am the more inclined to think this, having ſeen ears of Siberian barley of ſeventeen grains in length, which is the greateſt length I remember to have obſerved in the common barley.

It may be remarked, that the circumſtance of its requiring richer land does not ſeem to recommend it particularly to the county of Norfolk. On the contrary, the circumſtance of its being forwarder than the other greatly recommends it to that county; for it ſeems evident from thence, that the Siberian barley may be, and perhaps ought to be, ſown a fortnight later than the common barley.

A very large portion of our barley is conſtantly much damaged, both as to produce in meaſure and weight, by being ſown too late,* in conſequence of the neceſſity we are under of preſerving ſome of our turnips as long as poſſible.

I am ſufficiently aware that this experiment is not deciſive; and that a ſingle experiment, however deciſive it may ſeem, is not properly concluſive; but I hope you will ſoon receive many others, and this may then contribute its mite towards forming an average, from which a juſt concluſion may be drawn.

I am, Gentlemen,

Your obedient humble ſervant,

Bracon, near Norwich, E. HOWMAN.
Feb. 11, 1775.

P. S. As it has been demonſtrated before the Houſe of Commons, that the weight of the flour of heavy wheat exceeds the weight of the flour of light wheat *more* than the difference between the reſpective weights of the grain; it may be ſafely concluded, that the ſame thing holds true with reſpect to heavy and light barley of the ſame kind:

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* The Norfolk Farmers ſeldom begin to ſow Barley till May.

and with reſpect to the Siberian barley, it may certainly be concluded, that the weight of its flour exceeds the weight of the flour of common barley in a ſtill more eminent degree; becauſe a part of the weight of the common barley ariſes from a huſk, whereas the huſk of the Siberian barley is left upon the ear when threſhed. So that in this experiment, as the weight of the grain of the Siberian ſo far exceeded the weight of the grain of the common barley, as *almoſt* to compenſate for the great deficiency of meaſure per acre, the weight of the flour of the Siberian barley per acre would probably have been found equal to, if it had not *exceeded*, the weight of the flour of the common barley.

As a bread-corn indeed in this county, barley ſeems to be out of the queſtion; but the nouriſhment muſt be in proportion to the weight of the flour, however uſed.

Two things, however, want to be aſcertained by well-authenticated experiments, viz. the quality of the Siberian barley in malting; and the quality of the beer made of that malt.

ARTICLE XXVII.

On the Uſe of Fern-Aſhes *as a Manure for Wheat Land.*

GENTLEMEN, *Aug.* 10, 1779.

FOR ſeveral years paſt I have entertained a notion, that fern being burnt upon a fallow-ground would produce an excellent dreſſing for turnips and wheat; but have had no opportunity of making uſe of it myſelf, nor could I prevail till lately on either of the numerous farmers to whom I have mentioned it, to give it one trial.

The aſhes of fern are ſtronger than any other, and muſt, conſequently, on account of the great quantity of ſalts it contains, be of infinite ſervice in promoting vegetation,

I have great reaſon to believe, that fire has a beneficial effect on land, by reducing many parts of it to a more proper ſtate for diſtributing its nutritive particles to the roots of plants. It muſt alſo deſtroy a great part of the roots and ſeeds of all kinds of weeds which may be in the ground, and, conſequently, in that reſpect of very eſſential ſervice.

In the courſe of laſt ſummer, (1778) a farmer who lived in my neighbourhood, had a field of five acres under a fallow for wheat. It lay adjoining to a common which produces abundance of fern, and I obtained a promiſe from him to dreſs a part of it therewith. One other part of the field was dreſſed with dung alone; and the remainder with a mixture of lime and old mud taken out of a mill-pond at the bottom of the field. This laſt-mentioned dreſſing was well mixed, and laid on in a large quantity. No exact account was kept of the expence of the fern-dreſſing, nor of the quantity uſed;* we can, therefore, only gueſs at theſe particulars. It is, however, an undoubted fact, that 3s. 6d. is more than ſufficient to pay for cutting, drying, and carrying a waggon load in ſuch a convenient ſituation; and upon due enquiry, I was informed that about four waggon loads were laid on an acre; conſequently it muſt have been as cheap a dreſſing as could poſſibly be laid on it.

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* Theſe are ſome of the omiſſions which render the experiments made by common farmers ſo indeciſive. They ought to be particularly accurate in eſtimating the quantity of manure, and the expence per acre; and in deſcribing the nature of the ſoil. Without this, a juſt concluſion cannot be formed on the ſucceſs of any experiment.

This field of wheat was reaped the 3d inſtant, as far as the fern was burnt, (which was two acres) the wheat was in every reſpect the beſt in the field, being taller, ſtronger, thicker, the ears larger and finer, and the crop very clean from graſs and weeds. The reapers all declared they had not cut any wheat ſo good this ſeaſon.

The part dreſſed with lime and mud was better than that dreſſed with dung only, that being the worſt of all. The owner of the wheat and myſelf were both of the opinion, that the difference in reſpect of quantity of ſheaves was in favour of the fern-dreſſed part, nearly as ſeven to five; but the difference with reſpect to the quantity of clean corn muſt certainly be in a greater proportion, by reaſon of the ears being ſo much larger and finer.

I hope the above relation (the truth whereof may be depended on) will be ſufficient to convince thoſe who are properly ſituated for carrying the experiment into further execution. But here permit me to obſerve, that ſucceſsful as the above experiment proved, it was not fairly tried, for the following reaſons: Firſt, the fallow was not good for want of one or two more ploughings at the proper ſeaſon; ſecondly, the fern was not cut until the latter end of Auguſt, and ſome in September, conſequently there could not be ſo much virtue in the aſhes as there would have been in June or July.

I would recommend thoſe who are diſpoſed to try this dreſſing, to burn the fern at two different times—the firſt after the fallow has had the ſecond ploughing—the other part after the aſhes of the former are ſpread and ploughed in; by which means they will be more intimately mixed with the ſoil. I would alſo recommend that five waggon-loads of fern be burnt on an acre.

I am, your's, &c.

THOMAS PAVIER.

Weſt-Monkton near Taunton.

ARTICLE XXVIII.

On the Cultivation of Heathy Ground.

[By a Suffolk Farmer.]

GENTLEMEN,

SOME years ſince I broke up ten acres of heathy ground, which had long been only a ſheep-walk, and produced little elſe than furze, ling,* and mole-hill thyme.

* Erica, or Heath.

The ſoil was a looſe blackiſh ſandy gravel, and in general very dry. In March I turned it over with a whelming plough, about ten inches deep; and ran a pair of heavy harrows over it to get out the roots of the furze, ling, and other trumpery with which it had been over-run. Theſe I burnt, and ſpread the aſhes. In May, I ploughed it acroſs with the ſame plough, harrowed, burnt the weeds, &c. and ſpread the aſhes as before. In July, I ploughed it again, and ſpread thirty buſhels of lime per acre. In September, I ploughed it a fourth time, with a common plough, harrowed it, and burnt the rubbiſh. By this time it was in fine tilth. In October, I ſowed half of it with wheat, and the other half with rye; the former nine pecks, and the latter three buſhels per acre; the winter proving favourable, the rye came up thick and grew winter-proud. In January, I run a hurdle-fence acroſs, and turned in my ſheep to feed it off—they remained there till the end of February, and left the field almoſt bare. I then top-dreſſed it with ſix buſhels of lime per acre, which made the crop ſpring vigorouſly. It was as fine as I ever ſaw, and yielded me near five quarters per acre.

The wheat did not ſeem ſo ſtrong as I expected; but toward ſpring it thickened, and I had near four quarters per acre. Both the crops were clean, and anſwered very well.

The next year I broke up ſix acres more of the ſame kind of land, and treated it in the manner deſcribed above, till June, when I ſowed it with turnips. They came up very well, and eſcaped the fly. I gave them two good hoeings, leaving the plants fifteen inches ſquare. The crop proved very good in quality, but the turnips were rather ſmall.

At Michaelmas I turned in beaſts and ſheep, and in ſix weeks fed them off. The land was very clean, and the manure left by the cattle had ſo enriched it, that I thought there would be no great riſque in ſowing it with wheat.

I gave it a good ploughing—ſowed the wheat under furrow, and harrowed it down. It came up well, and the crop turned out near four quarters per acre.

In the autumn I laid on twelve loads of clay per acre; and in January, after a froſt had made the clay break and mix eaſily with the ſoil, I ploughed it in with the ſtubble. In March, I ploughed it acroſs. In April, I ploughed it a third time, and harrowed it fine: Then I ſowed it with Zealand barley, ten pecks per acre; two weeks after ſowing the barley, I threw in three pounds of Dutch clover. Both the clover and the barley ſoon made a fine appearance; the latter yielded five quarters per acre, and the former was a good thick plant at Michaelmas.

In the ſpring following I dreſſed it with forty buſhels of ſoaper's aſhes per acre, and in the ſummer mowed it twice: the firſt cutting was upwards of two tons, and the latter about twenty-five hundred per acre. I then broke it up for wheat, and had an excellent crop the ſummer following.

The lime, clay, and aſhes, had doubtleſs their ſhare in producing theſe crops; but I attribute my ſucceſs chiefly to the repeated ploughings and burning the rubbiſh.

This land, which when I broke it up was not worth five ſhillings, is now worth twenty-five ſhillings per acre.

I am, &c.

G. L.

June 20, 1779.

ARTICLE XXIX.

Inſtructions for the Prevention and Cure of the EPIZOOTY, *or* Contagious Diſtemper *among Horned Cattle.*

[Tranſlated from the French of Monſ. De Saive, Apothecary to the Prince Biſhop of Liege, by Mr. Moreau, of Bath.]

FARMERS have no need to be informed, how important a matter the preſervation of their cattle is. The conſiderable advantages they reap from them when free from accidents, and the loſſes they ſuffer when diſtempers ſpread among their herds, are ſufficient motives to make them feel the intereſt they have in preſerving their cow-houſes, ſtables, &c. from infection, and in uſing all poſſible means to prevent its progreſs. But as fatal experience has proved that the uſe of medicines, with the powers of which they were not well acquainted, has been frequently more prejudicial than ſalutary in the Epizooty; and that country people by placing an unlimited confidence in pretended ſpecifics, purchaſed at a very high price, have very often been drawn into a double loſs, by the death of their cattle, as well as the expence of ſuch drugs; it is thought the communication of an efficacious and cheap manner of treating cattle when attacked by this diſtemper, and of the means to prevent their being ſo, will be rendering an eſſential ſervice to the public.

The moment any ſymptoms of the diſtemper are perceived, about a pint and a half of blood ſhould be immediately taken from the beaſt, except he has been ill a day or two, in which caſe he muſt not be let blood; but in both caſes let the following draught be given:

No. 1. An ounce of the beſt theriaca (Venice treacle) diſſolved in a pint of vinegar, after which the back bone and the whole hide muſt be well rubbed with a dry hair-cloth, to heat the hide and promote perſpiration. No drink ſhould be given him but a white drink, compoſed of

No. 2. A handful or two of rye-meal in a pailful of clear water; and, ſhould the beaſt ſeem to want food, mix up ſome crumbs of rye-bread with ſome of the ſaid white drink, and give it him. The animal's mouth muſt be waſhed twice a day with a cloth dipped in a mixture of

No. 3. Vinegar and water, (equal quantity of each) with a ſpoonful of honey to a pint of it.

If on the ſecond day the beaſt has not dunged, a clyſter compoſed of

No. 4. A pint of water in which bran has been boiled, two ſpoonfuls of ſalt, and a ſmall glaſs of vinegar, muſt be given and repeated every day 'till the evacuations are natural and regular.

Beſides the above remedies, the following cordial mixture:—

No. 5. A pint of clear water, the ſame quantity of vinegar, four ſpoonfuls of honey or ſyrup, and two glaſſes of brandy,—muſt be given four times a day to facilitate and keep up perſpiration; taking particular care to repeat the friction as directed above.

Should the beaſt ſtill continue low and heavy, the draught No. 1. muſt be repeated, unleſs he ſhould be found to be hot and thirſty, in which caſe, uſe only the drink No. 2. On the fourth day, if he ſeems more lively and free from heat, purge him with

No. 6. Two ounces of ſalts, and one ounce of common ſalt, diſſolved in a pint of luke-warm water, with two ſpoonfuls of honey. If this does not procure four or five evacuations, repeat the clyſter the ſame day.

This mode of treatment muſt be continued without intermiſſion 'till the beaſt begins to eat; then you muſt only give him the white drink No. 2, and a little good fodder; or, ſome rye-bread dipped in ſtale beer, moderately ſweetened with honey or ſyrup.

The exterior treatment conſiſts in the application of ſetons in the beginning of the diſtemper, at the bottom of the dew-lap, and of cauteries towards the horns, between which ſome weight muſt be fixed, ſuch as, a ſtone of a pound weight, or more, wrapt up in a cloth, to keep it ſteady. This is neceſſary to keep the head warm. But above all, the friction muſt be cloſely attended to, in order to determine the critical efforts of nature.

It would be well alſo to evaporate vinegar in the cow-houſe, &c. and if it could be done without riſque, blowing of a few grains of gunpowder, twice a day in them, would be a very uſeful fumigation.

If, notwithſtanding theſe aids, the beaſt be not perfectly cured in ten or twelve days, they muſt be continued without bleeding, unleſs the inflammation be very conſiderable; but if, after all, the diſtemper does not give way, the beaſt muſt be killed, and then too much care cannot be taken to bury it very deep, cover it over with the earth which came out of the hole, and a turf over all, in order to prevent the putrid vapours, which exhale from ſuch carrion, corrupting the air, and ſpreading the infection.

As to the preſervatives from infection, the principal, after having taken every precaution poſſible to prevent its communication from other herds, conſiſts in waſhing the racks, troughs, &c. and the hide of the beaſt every day, with plenty of water; and, as the generality of people ſeem to place great confidence in ſtrong aromatic fumigations, they are adviſed, inſtead of the expenſive drugs of which ſuch fumigations are compoſed, to uſe fires made with the branches of green wood, throwing pitch on it to quicken the flames and perfume the air; theſe fires muſt be lighted at ſome diſtance from the houſes, for fear of accidents.

Common ſalt, given in ſmall quantities every day to horned cattle, is reckoned an excellent preſervative, particularly in a learned diſſertation on the contagious diſtempers among horned cattle, by Monſ. De Limborg, M. D. and F. R. S. of of London. It ſhould be obſerved, that though the report of an Epizooty is often ſpread, yet all the diſorders to which cattle are liable ſhould not be attributed to this epidemical diſtemper, ſince they are not exempted from this even when not affected with any contagious diſtemper. Therefore, when a beaſt is taken ill, enquiry ſhould be made if the infection be in the neighbourhood, as in ſuch caſe, a ſuſpicion of its being the Epizooty would be well grounded, and immediate recourſe ſhould be had to the remedies above-mentioned.

But as it often happens that cattle fall ſick after having eaten bad fodder, or having grazed in froſty weather on the tops of herbs, &c. when covered with ice and ſnow, (to prevent their doing which, all poſſible care ſhould be taken) to theſe accidents only are frequently to be attributed the ſickneſs and death of many beaſts which fall victims to them.

There is another accident no leſs dangerous, to which cattle are liable, which is, the waſhing them with waters prepared with different ſorts of poiſons,

eſpecially

eſpecially with arſenic to kill the vermin; theſe waters occaſion an itching in the ſkin, which obliges the animal to lick himſelf; in doing which he ſucks in the poiſon. It is evident, that ſuch pernicious practices may occaſion as fatal diſaſters and unhappy loſſes to farmers, as even the Epizooty itſelf; it cannot, therefore, be too much recommended to them, to forbear the uſe of ſuch things, which never fail doing the miſchief above deſcribed.

ARTICLE XXX.

On the Conſtruction and Uſe of Machines for Floating Paſtures, and for Draining Wet Lands.

[By a Gentleman in Wiltſhire.]

GENTLEMEN,

I Beg leave to propoſe to your conſideration, the propriety of offering a premium for the moſt ſimply conſtructed Machine, which ſhall fully anſwer the purpoſe of raiſing water either for draining or floating land; ſuch Machine to be worked by a ſmall running ſtream, where there happens to be a ſufficient fall of water:—And another premium for a Machine capable of being worked by wind to anſwer the ſame purpoſes.

Machines of theſe kinds, properly conſtructed, would at once improve lands, enhance their value, and reward the ingenuity of perſons ſkilled in mechanics.

There are many inſtances of paſture lands being raiſed two-thirds in their annual value, by being floated; viz. from one to three pounds per acre.

Any gentleman, therefore, who has twenty acres of land capable of ſuch improvement, might well afford to expend fifty pounds in erecting ſuch machines as would effectually anſwer the purpoſe; eſpecially as land ſo watered affords, in ſpring, the fineſt paſturage for ewes and lambs.

Where the wind is to be the moving power, the chief merit of the engine will conſiſt in its being ſo conſtructed as to be worked with the leaſt attendance, and turn about eaſily of itſelf to receive the wind from every direction. There is a certain point between the ſmall ſelf-working wind machines, and the large ones which require conſtant attendance; which point, could it be exactly hit upon, would determine what is the largeſt ſize of the *vanes*, and what the greateſt weight of the machinery, that can be conſtructed ſo as to be uſeful without attendance.

An attention to the conſtruction of ſuch machines as that erected on the top of Newgate, to work the ventilators, might throw ſome light on this ſubject. This turned on a pivot, to receive the wind from every quarter, by the impulſe of the ſhifting winds impreſſed on the horizontal vane; and its force was equal to what would be required to raiſe a conſiderable quantity of water to the height of two or three feet, which is generally ſufficient for the purpoſes of draining or floating land.

It ſeems to me that a method might eaſily be found to check or counteract the force of the wind when too violent, and even to ſtop the motion of the machine, by means of any great increaſe of the wind's force.

I therefore doubt not, but if the exerciſe of ingenuity were called forth, by the offer of ſuitable rewards, it would be exerted ſucceſsfully in conſtructing ſome engine which would effectually anſwer the purpoſe.

I am, &c.

Marlborough, Dec. 8, 1779.

ARTICLE XXXI.

Experiments to aſcertain the Uſe of Soaper's-Aſhes and Feathers, as Manures.

[Communicated to the Society by an Eſſex Farmer.

GENTLEMEN,

IN April laſt I top-dreſſed half a field of clover with aſhlep, or ſoap-boiler's aſhes, at the rate of ſixty buſhels per acre, leaving the other half in its former ſtate. The effect exceeded my expectations. There was no apparent difference either in the ſoil, or in the crop it produced laſt year; but in conſequence of this manure, the dreſſed part of the field produced, the laſt ſummer, nearly double the quantity of hay as the other.

I have alſo uſed this manure with great ſucceſs in cold wet ſpungy meadow-land. It has apparently dried it, and, by its warm quality and the ſalts it contains, made it produce much greater crops of graſs than before. I would therefore recommend it for both the above-mentioned purpoſes, if it is not already in uſe in your country, and can ſafely anſwer for its ſucceſs. The farmers here will readily give from twelve ſhillings to a guinea for a waggon-load, and fetch it five or ſix miles, and they find their account in ſo doing.

Another experiment, I think, may not be improper to mention: In October laſt, having a field ready for ſowing wheat, I manured one acre of it with ten buſhels of old feathers, procured from an upholſterer, ploughing them in as they were ſpread; and from the ſucceſs of this experiment, am perſuaded there is no kind of manure for either wheat or ſummer corn land equal to it. The acre thus manured produced me near forty-eight buſhels—the other part of the field not twenty-eight buſhels on an average. The quality of the land, and of the ſeed ſown, was equal; the extra produce could, therefore, only proceed from the manure.

I wiſh all poſſible ſucceſs to your undertaking; and am,

Your's, &c.

J. B.

Oct. 4, 1777.

ARTICLE XXXII.

On Planting Boggy Soils with Aſh; and the Slopes of ſteep Hills with Foreſt Trees.

[By Mr. *Fletcher*, near Northleach, in Glouceſterſhire.]

GENTLEMEN,

HAVING been pretty largely concerned in planting Foreſt Trees, on various ſoils, for more than twenty years, and tried different methods, I have found, by repeated experience, that no land whatever is ſo proper for the growth of *Aſh* in particular, as ſwampy, ruſhy, and boggy ſoils. I have planted Aſh on land which was ſo boggy and rotten, that the men were obliged to ſtand on boards, to prevent their being mired, and which, from its ſituation, could never be drained ſo as to render it fit for the cultivation of corn or graſſes. It was aſtoniſhing to ſee their growth. Facts can be eaſily produced to prove, that ſuch land (not worth a ſhilling per acre for any other purpoſe) has, in divers places, produced, in thirteen or fourteen years, from ſixty to ſeventy pounds' worth of the fineſt aſh poles, at a moderate price, beſides leaving a proper quantity of Oaks, &c. ſown with them, for maiden timber. Where labour is not very dear, an acre of ſuch land may be planted with four thouſand five hundred Aſh ſets, (which are a proper number) for eleven or twelve pounds. This, Gentlemen, I have frequently done, and I think it is an object worthy the attention of your Society.

A ſmall expence of weeding, pruning, &c. will ariſe for two or three years after planting, but then it is over; and I think no method of cultivation can poſſibly prove ſo advantageous on boggy ſoils.

A dead foxy ſoil, or land over-run with furze and fern, will alſo anſwer exceedingly well for copſing; and, as wood is in many places become ſcarce, I think planting ought to receive every poſſible encouragement.

There is another kind of land, which, although fit for ſcarcely any thing elſe, I have planted with great ſucceſs; and that is, the ſides of very ſteep hills, particularly in a northern aſpect. If there is any depth of ſoil, Aſh trees will do very well there; and for Scotch firs, and beech, it is a very proper ſituation.

I am, Gentlemen, yours, &c,

JOHN FLETCHER.

Oct. 17, 1777.

[We are too apt only to take the better ſide of a matter in which our judgment or our intereſt is concerned. An acre of Aſh, &c. may be planted for eleven or twelve pounds; but a very material expence is here omitted, the fencing them from the incroaches of common cattle, &c. which cannot amount to leſs than eight pounds per acre. We do not inſert this to prevent planting, but only that others may not be miſled.]

ARTICLE XXXIII.

Mode of Cultivating Turnips in Suffolk.

[By a Gentleman Farmer near Ipſwich.]

GENTLEMEN,

AS the Turnip huſbandry, properly managed, is the foundation of the beſt ſyſtem of Agriculture hitherto diſcovered, I take the liberty of ſending you an account of our method of raiſing that valuable root, which we find very advantageous, both as food for cattle, and as a cleanſing fallow for ſucceeding crops of grain.

In November, we plough in our wheat ſtubbles, and give the land four ploughings afterwards, at ſuch times as ſuit our convenience. Previous to the laſt ploughing, which ſhould be in the latter end of June, we cart on twenty loads (as much as three horſes can draw) of rotten dung, or muck, from the farm-yard, turned up in April, or early in May. Sometimes, as lime is the readieſt and cheapeſt manure in theſe parts, it is uſed inſtead of dung, but I think the latter preferable.

One quart of ſeed is ſufficient for an acre. New ſeed will come up three days ſooner than old.—What is ploughed for the laſt earth ſhould be ſown the ſame day, elſe, unleſs rain falls, the ground will be too dry for the ſeed to vegetate. When the turnips are within three days of being fit for hoeing, if the weather be dry, we run a pair of light harrows over the field, in a direction contrary to that of ſowing, and before they are hoed the firſt time. We find this to be of much ſervice.

The Turnips ſhould be hoed with a ſeven-inch hoe, and left full twelve inches* diſtant from plant to plant. We always hoe them twice, and by that means gain near double the weight in produce.—The labourers, who by uſe become very expert in this buſineſs, have three ſhillings and ſix-pence per acre for the firſt hoeing, and two ſhillings and ſix-pence for the ſecond, with ſmall beer.

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* Fourteen, or even ſixteen, is better.

Crops vary according to the quality of the land, from forty ſhillings to three pounds per acre in value,† and are moſtly fed off in the field.

In feeding them off we generally firſt draw off a rod in width round the field. This is done to prevent the cattle from ſpoiling them, by getting near the hedges for ſhelter in bad weather. The farmer firſt puts in his beaſts‡—then his beſt wether ſheep, and laſtly his lambs, who eat up all the refuſe left by the others.

As ſoon as the field is cleared of its ſtock, we plough it up for barley, and give four earths.—Sow three buſhels of barley per acre, half above and half under furrow. Fourteen pounds of red clover ſeed* is harrowed in with the barley, and the land rolled after the barley is come up. The produce from thirty to forty buſhels per acre. An excellent crop of clover generally ſucceeds the following ſeaſon, which, after being once cut for hay and then ſeeded, is ploughed in for wheat.

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† This is a very indeterminate quantity, as what may be worth forty ſhillings in one place may be worth three pounds, or more, or leſs, in another.

‡ We cannot agree with the cuſtom of turning in beaſts before ſheep intended to be fatted. If the beaſts are intended to be fatted, we apprehend the intention will be very materially leſſened, by their running about. A ſtalled Ox ever while you live, except in fine meadows.

* Too much. Eight pounds are enough, if the ſeed be good, but on all light lands, five pounds of black graſs, or hop clover milled, and five pounds of broad clover, will anſwer moſt incomparably well.

The Turnip is our fallow, and the better that crop is, the finer are the crops of barley and wheat which ſucceeds it. When the land is too wet to feed the Turnips off, we draw and carry them on ſome contiguous paſture.

I am, your's, &c.

N. T.

Nov. 19, 1777.

ARTICLE XXXIV.

On raiſing Potatoes from Seed.

[By the Rev. Mr. LAMPORT, of Honiton.]

GENTLEMEN,

I Take the liberty of recommending to your conſideration, to offer a premium for raiſing Potatoes from ſeed; and alſo of ſending you the method of raiſing them, preſcribed by the ingenious Dr. Hunter, which, from ſeveral trials, I have

I have found to anſwer all the encomiums that gentleman has beſtowed on it.

My reaſons for making this propoſal are,

I. It perfectly coincides with a material part of your benevolent plan to increaſe the quantity of food for the poor: As an acre cannot be planted in the common method for leſs than twenty-four or twenty-five ſhillings, the mere purchaſe of the roots; the procuring plants from *ſeed* will not coſt more than five ſhillings:* So that Potatoes of the beſt kinds to the amount of twenty ſhillings an acre, will be annually preſerved for food,

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* The principal advantage ariſing from raiſing Potatoes from ſeed, will be the obtaining a better or a larger ſpecies, which will be more profitable in its cultivation for ſome years, than a ſpecies planted for many years together, without change: But ſurely no immediate advantage can happen to the planter: Let the oppoſed accounts aſcertain the fact.

	£.	s.	d.		£.	s.	d.
Sowing the ſeed	0	5	0	Potatoes	1	4	0
Rent of the land	0	15	0	Rent —	0	15	0
Hoeing ——	0	9	0	Hoeing —	0	9	0
Planting — —	0	8	0	Planting —	0	8	0
	£.1	17	0		£.2	16	0
Difference	0	19	0				
	£.2	16	0				

Produce of ſown 150 buſhels, at 2s. — £.15 0 0

Produce of the planted 200 buſhels, at 2s. £.20 0 0 inſtead of being cut for planting. This will be a ſaving to the four counties, in proportion to the number of acres planted in the method recommended.

II. Various ſorts of Potatoes are produced from the ſeeds of the ſame apple, and by this means *new* kinds would be introduced, ſome of which might be more valuable than any yet raiſed.— The farmer will have it in his power, at his own option, to preſerve for his own uſe the beſt kinds, or thoſe beſt adapted to his ſoil, and to diſpoſe of the reſt either by ſale, or as food for his cattle.

III. Potatoes will, after a few years, unavoidably degenerate, and decreaſe in produce; while thoſe newly raiſed from the ſeed will produce, at leaſt, one third more than thoſe which have been uſually propagated in the county, or which can be procured from other counties, unleſs the farmer could certainly know that the Potatoes he purchaſes were newly raiſed from ſeed alſo.

For theſe reaſons, this method appears likely to prove of great public utility, and to deſerve a premium for encouraging it, eſpecially as the proceſs is neither difficult nor expenſive.

The method is as follows:

Let the farmer, or gardener, gather the apples of his potatoes in October, and hang them up in a warm room till Chriſtmas. Then waſh out the ſeeds, ſpread and dry them on paper, and preſerve them from damps till the ſpring. In March ſow them in rows one foot aſunder, in ground well prepared; and when the plants are three inches high, gently earth them up. About three weeks after, tranſplant them in land well dunged and made fine, and dig them up in autumn.

By this means you may have great varieties, and your crop next year will be large both in ſize and quantity.

ARTICLE XXXV.

On the Method and great Advantages of extracting the Eſſence of Oak-Bark for Tanning.

[Communicated to the Society, Dec. 7, 1777.]

GENTLEMEN,

AS there are large quantities of oak bark annually imported into this kingdom, the bulk of which renders the freight very high, and conſequently makes the article very dear, beſides endangering its being ſpoiled by getting wet, it would be of great advantage to the community if the aſtringent qualities of the bark could be extracted on the ſpot where it grows, and reduced to the conſiſtency of a thick eſſence. By this means, the virtues of a large bulk of bark might be collected into a ſmall ſpace, which would make a great ſaving both in the freight and inland carriage, and render it a ſtaple commodity for trade.

On conſidering the ſubject attentively, I am of opinion, that the ſcheme is practicable, and would anſwer extremely well. With reſpect to the proceſs, this extract muſt firſt be made either by decoction or infuſion; and then the watery particles muſt be evaporated, to reduce it to the conſiſtency deſired, in ſuch a manner as not to loſe any of the qualities neceſſary in tanning.

Suppoſe the operator has at his command a common family brew-houſe, with its neceſſary utenſils: let him procure a ton of good oak-bark ground as uſual for the pit; and having placed a ſtrainer to the maſh-tub, fill it two-thirds with the bark; heat as much water, nearly boiling, as will ſufficiently moiſten it, and maſh it well together. After it has ſtood about two hours, draw it off clear, and put it into a caſk by itſelf. Make a ſecond extract with a ſmaller quantity of boiling water than before, ſo as to draw off a quantity nearly equal to the firſt, and put that alſo into the ſame caſk with the former.

Theſe two extracts will probably contain in them as much of the virtues of the bark as the quantity of liquid will abſorb.

A third extract, rather more in quantity than the other two, may be made from the ſame bark, and as ſoon as drawn off, ſhould be returned into the copper again when empty, and applied for the firſt and ſecond maſh of a quantity of freſh bark, as the three extracts may be ſuppoſed to have carried off the virtues of the firſt. Then proceed as before till all the bark is ſteeped, and a ſtrong liquid extract is drawn from it. The bark, when taken out of the copper, may be ſpread in the ſun to dry, and ſerve as fuel in the ſucceeding operations.

The next proceſs is, to evaporate the watery particles from the extract, by a gentle heat, till it comes to the conſiſtency of treacle. This may be done either by the air and heat of the ſun, or by the *ſtill*, or iron pan, over the fire. For this experiment, ſhallow veſſels will be ſufficient. It muſt not be heated to boil; for that would be likely to drive off by ſteam* what we want to retain. Let the evaporating veſſel be covered, during the proceſs, with a wooden lid, through which a number of holes are bored with a gimblet, as the ſteam will fly off much quicker this way, than if left uncovered; and for this reaſon, that in the latter caſe, the air preſſing on the whole ſurface, would prevent the ſteam from riſing ſo freely as it will do through a number of ſmall apertures.†

You will be pleaſed to obſerve, Gentlemen, that my firſt object was, to get this extract made in America, from whence large quantities of rough bark were annually imported; but the unhappy ſtate of the colonies prevents its taking place there at preſent. In ſome future time, perhaps, the attempt might ſucceed; and as the ſun is much hotter there in ſummer than with us, the evaporation might be made by its heat, without the expence of fire.

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* In this point, we think our correſpondent miſtaken; being of the opinion, that boiling would not cauſe any evaporation of the eſſence itſelf.

† In this reſpect alſo we think the Author miſtaken.

In the colder climates, ſuch as Canada, where Dutch ſtoves are uſed five months in the year, the ſame fire would ſerve for evaporation; ſo that when the proceſs, which is not difficult, becomes generally known, the country people might collect bark in the ſeaſon; and during winter, when they have little to do, extract its eſſence. But were it carried on in a manufactory, the heat might be ſo frugally applied as to occaſion little expence; for the evaporating veſſels might be ſo conſtructed and placed, as for the ſteam to empty itſelf into the ſteeping tub, and there condenſe itſelf into hot water. This would ſave both time and expence.

The univerſal uſe of leather, and the great ſcarcity of oak bark, make theſe conſiderations of great importance to the public; and it were much to be wiſhed, that fair trials were made, both of extracting the eſſence, and tanning leather with it when extracted, with an accurate regiſter of the expence attending each proceſs.

I am, Gentlemen, &c.

ARTICLE XXXVI.

On Drilling PEASE.

[By a Gentleman near Taunton.]

GENTLEMEN,

PERHAPS the following obſervations on a crop of peaſe, may not be wholly unworthy your notice.

A farmer in my neighbourhood ſowed a few peaſe in drills, in a common wheat field, in the beginning of November laſt, for the uſe of his family. We had ſome meals of them well grown, when the price was two ſhillings and ſix-pence per peck; and when they were ſold at Taunton market for ſixteen-pence per peck, the ripeſt being gathered from four of theſe drills only, (from which none had been gathered before) produced two pecks of peaſe; and as the drills were only eighteen feet in length, and two feet diſtant from each other, the whole ſpace of ground occupied by the four drills was no more than ſixteen ſquare yards: from whence it appears, that one acre of ground, ſtatute meaſure, would have produced upwards of ſix hundred pecks of green peaſe at the firſt gathering; or, if you calculate by the acre of fifteen feet to the perch, (which I take to be the faireſt way) the produce would be five hundred pecks, which, at the then current price, amounts to thirty-three pounds ſix ſhillings and eight-pence. An ample encouragement for trying this method on a larger ſcale.

I am, &c.

T. PAVIER.

[We are obliged to this as well as the reſt of our correſpondents, for communicating accounts of experiments, and making calculations thereon; but muſt beg leave to obſerve, that the advantages ariſing from many experiments made on a *ſmall ſcale*, will not be proportionably great, when that ſcale is conſiderably enlarged. In the inſtance before us, we doubt not the truth of the account given: the calculation is right, and the profit obvious: but we cannot think that the produce of an acre (much leſs of a larger quantity) would ſell for the ſum mentioned. An additional quantity of five or ſix hundred pecks of green peaſe, at the time they are ſold at ſixteen-pence a peck, would immediately reduce the price in any country market. We by no means hint this with a view to diſcourage experiments and calculations; but merely to guard againſt expectations of profit too ſanguine to be realized. If the above-mentioned crop were ſold at only nine-pence a peck, the farmer would be well paid for his labour.]

Article XXXVII.

An Account of the Culture of Siberian Barley, in 1774.

[Tranſmitted by the Norfolk Agriculture Society.]

THE intention of the Norfolk Gentlemen being to aſcertain the poſitive produce of the grain, and alſo the comparative produce in the two methods of ſowing in broadcaſt, and of ſetting by the dibble, the following experiments were made:—

The ground choſen for this purpoſe was a ſandy loam, containing, excluſive of hedges, 1 acre, 3 roods, 6 perches, 19 ſquare yards, ſtatute meaſure. It had been in graſs three years at the autumn of 1772, when it was broke up. In the ſummer of 1773, it bore oats, and in autumn the ſame year, had three ploughings; in the ſpring of 1774, it was ploughed three times more.

Being then in good order, it was divided into two parts.

No. 1. contained 3 roods, 2 perches, 9 ſquare yards. This was ſown with Siberian Barley, by dibbling, from the 9th to the 13th of May 1774. The diſtance of the holes was about ſix inches one way and four the other. The directions given were to drop not more than two grains into each hole, and they were in general executed exactly. The quantity of grain ſown in this part was one buſhel and a handful. On the 18th of June, the ſtalk was two feet in height, and the ear completely formed in the ſheath. It proved a very wet ſummer, and the rain beat it down. It was cut September the 6th; ſome of it grew before it was carried home, and ſome could not be threſhed out of the ſtraw; but the produce was forty buſhels one peck, Wincheſter meaſure, each buſhel weighing fifty-four pounds.

No. 2. (the other part of the field) contained 1 acre, 4 perches, 10 ſquare yards. This was ſown under furrow with Siberian barley, May the 10th and 11th, 1774, by which means this part had one ploughing more than the other. The quantity of grain ſown was four buſhels. This was ſooner and more beaten down by the rain than the other, as it grew thicker; but as it was cut ſooner, (viz. Auguſt 26) it was not ſo much damaged, the other having begun to grow before it was cut. This produced forty-nine buſhels Wincheſter meaſure, each buſhel weighing fifty-four pounds. Bread was made of this barley, mixed with wheat flour, in the two proportions of half each, and of two-thirds barley and one-third wheat. This was repeated ſeveral times, and the *latter* proportion was thought to make a ſweet and pleaſant bread.

COMPARISON.

BROAD-CAST.

Time of Sowing.	*Quantity of grain ſown.*
May 10—11.	4 buſhels.
Time of Cutting.	*Produce.*
Aug. 26.	49 buſhels, 54lb. per buſh.

DIBBLED.

Time of ſowing	*Quantity of grain ſown.*
May 9 to 13.	1 buſhel.
Time of Cutting.	*Produce.*
Sept. 6.	54 buſhels, 54lb. per buſh.

So far as a ſingle experiment can be concluſive, it appears, 1ſt. That on land in good order, the produce of Siberian barley is great.

2. That the method of ſetting by the dibble is moſt productive in the proportion of about one tenth part.

It is to be obſerved, that three-fourths of the ſeed is alſo ſaved; but this is allowed for the extra expence of dibbling.

The increaſe on the dibbled part was forty from one nearly.

ARTICLE XXXVIII.

On a new Oil Manure.

[From a Gentleman Farmer in Norfolk to the Norfolk Society; and communicated to the Society at Bath by Thomas Beevor, Eſq; of Hethell-Hall.]

GENTLEMEN,

I Now take the liberty to lay before your reſpectable Society a Receipt to make a manure for the improvement of lands, which I have with much pains been ſo happy as to find out, and which bids the faireſt of any thing yet thought of, for general benefit. It is equal to either muck *(dung)* or oil-cake, both of which are allowed by all who uſe them to be of great utility; but there are few who can find a ſufficient quantity of the former, and the latter is too expenſive for general uſe. *

As the prolific quality of oil-cake is only in proportion to the oil it contains, the compoſition I now recommend muſt be preferable, having a much greater quantity of oil in it; and as malt-coombs are a manure of themſelves, eſpecially for turnip-land, at about eighty or ninety buſhels per acre, I dare venture to aſſert, that twenty-four buſhels, with the addition of oil, is equal to the above quantity, or even to twelve loads of muck.

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* Manure for one acre of land, with the expence.

Rape, or train-oil, 6 gallons, at 2s. 6d.	£.0	15	0
Sea-ſand 6 buſhels, at 2d.	0	1	0
Coarſe Salt 2 buſhels, at 1s.	0	2	0
Malt-coombs, 24 buſhels, at 4½d.	0	9	0
	£.1	7	0

The method of preparing it is, to ſpread the coombs on the floor about four inches thick—then ſprinkle the ſalt as level as you can; throw on half the quantity of ſand, and half the quantity of oil, out of a watering pot—turn it and rake it well—afterwards add the reſt of the oil and ſand as before—turn it well 'till thoroughly mixed, and then throw it in a heap for uſe.

The ſand, and ſalt mixed with it, not only occaſion it to imbibe the oil more freely, but likewiſe give it a better body for the conveniency of ſpreading on the land.

Some Gentlemen may think that the quantity of ſalt is too little; but I am truly convinced of the contrary, having found by experience, that a ton, or even a ton and a half, has not anſwered ſo well as three or four hundred. The caſe is very ſimilar with regard to lands near the ſalt marſhes, where the tide ſometimes overflows them; and it is well known by thoſe who occupy ſuch lands, that nothing will grow for three or four years; but afterwards, they will become very fertile. The reaſon I ſhall not take upon me to give, but have found it ſo by my own experience.

If Gentlemen will make trial of this manure, I have no doubt but it will anſwer their utmoſt wiſhes.

Some farmers here have uſed only half the above quantity per acre, notwithſtanding which they had good crops; and it is the opinion of many, that it will prove of great utility as a manure, which is the hearty wiſh of your obedient humble ſervant,

J. C.

Wells, (Norfolk) June 12, 1776.

P. S. I was obſerving a few days ſince a field of barley belonging to Mr. Tuttle, of Wareham, that was overflowed by the tide two or three years ago; and nothing has grown upon it ſince till the preſent year; but there is now a proſpect of the fineſt crop I ever ſaw, eſpecially on that part of the land which was overflowed. This I conſider as a proof that too much ſalt is very injurious; and would therefore adviſe every farmer who makes uſe of it, to adopt the quantity as may be found neceſſary according to the quality of the land.

[On this Gentleman's manure we beg leave to remark, that nothing appears to us againſt its becoming generally uſeful but the extra expence that muſt attend it, from the great advance of oil, and which muſt alſo be occaſioned by the carriage of ſea-ſand and droſs ſalt, in moſt inland ſituations. Yet to thoſe who live near the coaſt, and are willing to uſe oil at its preſent price, we have no doubt of its anſwering the purpoſe; perhaps common ſand may be as proper as that from the ſea ſhore; but in this caſe we think more ſalt will be requiſite.]

ARTICLE XXXIX.

An Account of a Mode of Weaning and Rearing Calves, by a Norfolk Farmer.

[Communicated by the Norfolk Agriculture Society.]

MR. Whitby, of Wallington, did, between the firſt of December 1776, and the firſt of April 1777, wean and rear on his farm, ten cow calves, and thirteen bull calves, by the method following:—At three days old, they were taken from the cows, put into a ſhed, and fed with flet (ſkim'd) milk for a month, allowing three quarts to each calf morning and evening. When a month old, they were fed with the like quantity of milk and water, morning and evening, with hay to feed on in the day time, and at noon they were fed with oats and bran equally mixed, allowing half a peck to one dozen calves. At two months old, they were fed only in the morning with milk and water, they had hay to feed on in the day time, and at evening, inſtead of noon, had the ſame quantity of bran and oats, with water to drink. They were fed in this manner until the middle of April, when they were turned out to graſs all day, and taken into a ſhed at evening, and fed with hay;

until there was plenty of graſs, and the weather grew warm.

Such of the calves as were weaned in March were continued to be fed with milk and water every morning until Midſummer. All the ſaid calves are in good health and condition; and the Society allowed the premium offered on that head the preceding year.

ARTICLE XL.

On raiſing a Crop of WHITE OATS *and* GRASS-SEEDS.

[By a Berkſhire Farmer.]

GENTLEMEN,

AS I obſerve in your advertiſements frequent invitations for the correſpondence of practical farmers, the following account, being a juſt one, is much at your diſpoſal.

In the year 1774, I bought twelve acres of land, which had been ſown with white oats and graſs-ſeeds to lay down for meadow.

On examining my plant of clover, &c. after the oats were off, the couch-graſs and clutter, [*weeds*] from its having been laid down very foul, had almoſt totally deſtroyed the young graſs; there being ſo little left, that no profit could be expected from letting it ſtand. I therefore had it ploughed up immediately; and my crop of oats having been houſed pretty early, I gave it a good tillage. After getting out as much of the couch-graſs and rubbiſh as I could, before the winter came on, I had it ploughed up in rough ſtetches, (or ſingle ridges) that it might have every advantage of the winter's froſt to mellow it, which it did very effectually. In the ſpring my plough went to work again: we found the roots of couch, &c. which had been diſturbed by the tillage in autumn, generally dead. Then I ſowed it again with white oats and graſs-ſeeds, not the rubbiſh of a hay-loft, which abounds generally with the ſeeds of numberleſs weeds; but the beſt I could collect. My neighbours perſuaded me to dung it; but this I omitted till the crop of oats was got in. I then dreſſed it well with the beſt ſtable-dung I could procure. My crop of oats was but indifferent; but my graſs the following ſummer, being of the moſt excellent kinds, was full two tons per acre at one cutting. I did not mow it a ſecond time, as

I wanted the ſeed—nor did I cut it the year following. At the latter end of the ſucceeding year I dreſſed it again, and have had as good crops ſince as from meadow-land held at one-third more annual rent.

I am, &c.

C. T.

Berks, Aug. 24, 1779.

ARTICLE XLI.

Anſwers to the Society's printed Liſt of Queries.

[Communicated by EDWARD SAMPSON, eſq; High Sheriff of the County of Gloceſter.

Henbury, Dec. 14, 1778.

GENTLEMEN,

I Have the pleaſure herewith to tranſmit anſwers to the liſt of Queries, with which you ſome time ſince honoured me. If they in the leaſt degree anſwer the Society's expectations, it will be a ſatisfaction to

Your very humble ſervant,

EDWARD SAMPSON.

Anſwers to the Queries propoſed by the Agriculture Society at Bath, by

RURICOLA GLOCESTRIS.

To the Firſt Query.—Cone wheat, and blue ball, on ſtrong clays, and deep rich loams; the ſeveral kinds of Lammas wheat on loams, ſand, gravel, and ſtone braſh land. Barley moſt natural on ſandy, gravelly, and ſtone-braſh; but it will return large crops on clays, although the grains are more coarſe and brown.

Peaſe for culinary uſes on ſands and loams;—for pigs, on clays, gravel, and ſtone-braſh.

Beans on ſtrong clay and deep loam, the ſame as cone wheat.

Vetches on gravelly ſoil and ſtone-braſh.

Turnips on every kind of ſoil, with good and repeated ploughings, and proper manures;—moſt natural on a ſandy loam.

Cabbages on ſtrong deep clays and rich loams.

Carrots on deep loams abounding with ſand, and not too ſtiff; and on any deep light ſoil duly cultivated.

The quantities of ſeed depend much on the ſeaſon and time of ſowing. Wheat from ſeven to ten pecks per acre. Barley from ten to ſixteen pecks. Peaſe and beans ten pecks if drilled, twelve if planted, ſixteen if ſown, and earthed or harrowed in. Vetches from eight to ten. Turnips from ten to twenty-four ounces. Much depends on the ſkill of the ſower. Cabbages and carrots have the like dependence.

The average produce cannot be aſcertained with preciſion, becauſe of blights, mildews, earth-grubs, and many other accidents to which all ſorts of grain are incident; and, excluſive of theſe, much depends on the nature of the ſoil and mode of cultivation.

To the Second.—On clay and loamy ſoils, if old arable long in tilth, the following courſe is generally practiſed: 1. Turnips, as a fallow-crop; 2. Barley; 3. Clover, mowed early, and then fed; 4. Wheat, on one earth; 5. Peaſe, or Beans; 6. Wheat, then Turnips. If a new farm from paſture, 1. Beans or Peaſe; 2. Wheat; 3. Barley: Or, 1. Turnips; 2. Barley; 3. Clover; 4. Wheat, and then Turnips again.

On light thin and ſtoney ſoils, 1. Turnips; 2. Barley; 3. Clover, mowed early and fed till Midſummer,

ſummer, then let it grow, and plough it in for wheat. Vetches in winter, and fed off for Turnips.

To the Third.—For ſtiff clays, ſand in due quantity; for light ſand, clay in due quantity; and for both, lime duly prepared; lyas lime for light ſands; marble lime for heavy ſoils.

For gravelly and loamy land, yard-dung, lime-chalk, and ſhovelling of highways in compoſts.

For mooriſh and cold ſoils, gravel, highway-earth, very ſmall ſtones, coal-aſhes, ſoaper's-drains, and pig's-dung.

For cold wet lands, no manure effectual without draining, and then the ſame as for the laſt.

For ſtone-braſh land, any kind of manure laid on in a half rotten ſtate. The quantity per acre muſt be learned from experience. It is better to lay on at twice than too much at once. The ſeaſon from February to September. The time of laſting is according to the underſtratum, which, if compact and warm, will render the manure durable; if looſe, or a cold clay, it will ſoon be gone.

To the Fourth.—No new diſcovery of manure in the ſouth parts of Glouceſterſhire, except about Briſtol. The dung and urine of pigs, fatted by the waſh of the diſtillers, is found to be excellent manure for any kind of land, but more eſpecially cold clays. The lees or ſuds of ſoap-makers are alſo found of great uſe, as well as the urine of pigs, by being ſprinkled over paſtures in the ſame manner as the roads are watered about London. Care muſt be had to the due quantity, or the verdure will be deſtroyed. Experience is the beſt guide.

To the Fifth.—All dreſſings on cold wet lands will be very ineffectual, unleſs the lands are firſt dried by under-draining. Soot is the moſt beneficial, only the hay will ſmell of it.

To the Sixth.—Stone is the beſt and moſt laſting; wood is a ſubſtitute, and will be laſting alſo if conſtantly wet; if not, it will ſoon be rotten, and then the trenches will cloſe.

To the Seventh.—The wood which ſtands beſt againſt weſt winds, on high expoſures, is the beech and the black mountain ſallow, (Salix Latifolia Rotunda, being the thirteenth ſpecies of Miller) with a plumb-tree leaf; on mooriſh and boggy-ground, the black alder.

To the Eighth.—Lucerne is cultivated by very few, and thoſe more for fancy than profit, as it will bear no rival, but muſt be kept hand-weeded, or it will ſoon decay; nor will it ſucceed even with ſuch care on lands of a cold or moiſt underſtratum.

Saintfoin is cultivated on dry, gravelly, and ſtone-braſh land, when the underſtratum is not of a cloſe compact texture, but of a looſe open ſtoney nature, or chalky. It anſwers well in the broad-caſt method. The cauſe of its often failing is owing to the nature of the land, rather than to the mode of cultivation.

Burnet (the Pimpernella Sylveſtris of Ray, Pimpernella Sanguſorba major of C. B. 160, and Sanguſorba of Linnæus) grows naturally in moiſt clay meadows, in this county; but the cattle will prefer almoſt all other common plants found in thoſe paſtures to it. The leſſer Burnet (or Pimpernella Sanguſorba minor herſuta of C. B. P. and Poterium of Linnæus) delights in a gravelly dry ſoil, and is frequent in healthy ſheep-paſtures, and eaten greedily by thoſe animals.

To the Ninth.—Turnips are generally ſown as a fallow crop, after the land (of any ſort) is well tilled, cleanſed from weeds, and dreſſed with yard dung, lime, or any compoſt. We generally ſow them about Midſummer, and hoe them twice; they may be effectually preſerved from the fly, if, as ſoon as the ſeed-leaf appears, wood-aſhes be ſown over them as often as it is waſhed off by dews or rains.

To the Tenth.—The drill is preferable to the broad-caſt method, in looſe or loamy land; but not in clays or ſtoney ſoils.

To the Eleventh.—The comparative advantage of oxen is great where they are bred by the farmer who uſes them, and fed on commons in ſummer, and on ſtraw in winter, till three years old, (but not ſo much where they are bred in incloſed lands, or bought at four years old) and worked till ſix or ſeven; they are leſs liable to ſickneſs than horſes; and if accidents befal them, they are of ſome value. Two oxen will do more work than one horſe of equal value with them, nearly in proportion as ſix to four, and they coſt leſs in keep.

To the Twelfth.—In places ſubject to rot ſheep, fold them before the dew falls, and keep them in fold it till it exhales in ſpring and ſummer; in winter attend to this as much as the weather will admit; and feed them in the fold, or on turning out, with hay on which ſalt has been ſprinkled at ſtacking up at harveſt.

It is a known truth, that the paſtures (though marſhes) which are overflowed by the ſalt water at the vernal or autumnal high tides, never rot ſheep, but are an antidote to the diſeaſe, if the infected are depaſtured thereon while the diſeaſe is recent.

To the Thirteenth.—Chiefly in the croſs-tree, pot-hook-drail, ſwing-plough, which with two horſes will plough moſt kinds, and with three horſes any ſort of land; having a point to the ſhare for ſtoney lands, and no point in lands that are not ſtoney.

ARTICLE XLII.

On the great Increaſe of Milk from feeding Milch Cows with Saintfoin.

[By an Eſſex Farmer.]

GENTLEMEN,

IN looking over your liſt of premiums, I was much pleaſed to find your Society had encouraged the cultivation of Saintfoin. In this neighbourhood,

bourhood, we have many large fields of this excellent graſs, and find it the beſt and moſt profitable of any that we raiſe.

As the roots ſtrike deep in our chalky ſoil, this plant is not liable to be ſo much injured by drought as other graſſes are, whoſe fibres ſhoot horizontally, and lie near the ſurface. The quantity of hay produced is greater and better in quality than any other. But there is one advantage attending this graſs, which renders it ſuperior to any other; and that ariſes from feeding it with milch cows. The prodigious increaſe of milk which it makes is aſtoniſhing, being nearly double that produced by any other green food. The milk is alſo better, and yields more cream than any other.

I give you this information from my own obſervation, confirmed by long experience; and if your farmers would make trial, they would find their account in it far more than they expect.

I am, &c.

J. B.

Near Saffron-Walden, Feb. 1778.

ARTICLE

ARTICLE XLIII.

An Account of the Succeſs attending the planting Moor-Land with Aſh Trees.

GENTLEMEN,

BEING lately in the county of Eſſex, I was informed that a gentleman farmer there had raiſed a very fine plantation of Aſh trees, on a piece of moor-land, which was worth little for any other purpoſe. Knowing him to be a very ingenious and capable farmer, both willing and able to communicate uſeful knowledge, I thought my examining the plantation, and giving you a juſt account of its planting, progreſs, produce, and preſent ſtate, might be acceptable to the Society.

The ſoil was a black boggy moor, and had formerly been a hop ground; but ſo wet that it would not anſwer for that or any other purpoſe in agriculture, although it had been cut acroſs with many open drains, five feet deep, to take off the water. The quantity was three ſtatute acres, and the following account of the planting and produce was given me by the farmer in writing from his own Regiſter.

‘ In the ſpring of 1764, I planted theſe three ‘ acres of black moor with ſmall ſeedling Aſh ‘ plants, drawn from my woods, hedges, and waſte ‘ grounds, at four feet diſtance from each other. ‘ When they had ſtood two years, I cut them down ‘ within four inches of the ground. I then let ‘ them ſtand ten years, during which time they ‘ throve exceedingly; and in February 1776, I ‘ cut one acre and half. The produce was as ‘ follows:

	£.	s.	d.
‘ 31 hundred of poles, ſold on the pre- ‘ miſes for — — —	39	6	0
‘ 11 loads of firewood, ſold alſo on the ‘ premiſes, at 16s. per load —	8	16	0
	£.48	2	0

‘ The other acre and a half is ſtill ſtanding, and ‘ much ſuperior to that already cut.’

On examining the ſtanding part of the plantation, it appeared to be in the moſt healthy and vigorous ſtate. The ſhoots were generally three in each root, ſtrait and clean; the bark being clear, ſmooth, and of a fine blueiſh green. The annual ſhoots were frequently from three to four feet in length; and from their preſent appearance, I am

I am fully of the opinion that, if cut next ſpring, this part of the plantation will exceed the other at leaſt one-third in value.

The young ſhoots, in that part of the plantation cut in 1776, are remarkably ſtrong and healthy, and bid fair to be fit for a ſecond cutting in ſeven years.

By this eaſy and judicious management, one acre and a half of land, not worth five ſhillings a year for any other purpoſe, has paid the planter near fifty pounds in twelve years; and the acre and a half now ſtanding will, if cut next ſeaſon, probably bring him full ſeventy pounds.

The firſt five years after planting, they were kept clear from weeds, but that trouble and expence has been long ſince at an end; and in time to come, after deducting the ſmall charge of cutting, the whole produce may be reckoned clear gain.

This, ſurely, muſt be a ſufficient encouragement for gentlemen in other counties to plant ſuch lands in the ſame manner, as it will at once prove beneficial to the owner, and to the community.

I am, &c.

EDMUND RACK.

Bath, June 28, 1779.

ARTICLE XLIV.

On the Uſe of Stagnant Water as a Manure.

[By a Gentleman Farmer in Norfolk.]

GENTLEMEN,

I Make no apology for tranſmitting to you an account of the following experiment, becauſe I think it may prove as uſeful to others as it has been to myſelf.

At the lower end of my farm-yard is an old pond, or reſervoir of water, which is the common receptacle of every thing that drains from the other parts of my yard, ſtables, and the ditches of ſeveral fields. On my firſt coming into the farm, it was nearly dry, but during the courſe of the winter, a conſiderable quantity of water was collected in it, which, as ſpring advanced, grew very thick and dark coloured, and in the ſummer abounded with inſects.

The weather proving dry, and my pumps failing, I uſed a quantity of this water for my garden, and was ſoon ſurprized to ſee how ſtrong and vigorous the plants proved that were watered with it. This led me to conſider that it might probably prove a rich manure for paſture-land; but the quantity then remaining in the pond was too ſmall to make any conſiderable trial with. Determined, however, to aſcertain the truth or fallacy of my conjecture, in the latter end of July, 1772, I meaſured out two ſpots of fifty ſquare yards each, in an adjoining meadow, which had been mowed, and was much burnt up. And in order to prove how far this exceeded other water, I watered one ſpot with it, and the other with water from a ſmall adjacent river, three times a week, for a month together, there being little rain all that time. I obſerved the effects carefully, and at the end of the month, the two ſpots were in the following ſtates: That which had been watered from the river was far better than the reſt of the field. The graſs was tolerably thick and high, but weak and faint, ſeeming to have little virtue in it, and of a yellowiſh green. But the other ſpot, which had my pond-water, the graſs was much thicker and higher; being as ſtrong and ſucculent as any part of the firſt crop had been, of a deep healthy green, and near eighteen inches high. I then determined to cut both and keep them ſeparate, in order to aſcertain the comparative value of the hay. I did ſo; and when it was made, on weighing each, I found that on which the pond-water had been uſed near double in quantity, and much ſuperior in quality, to the other.

I did not water either of the ſpots any more that ſeaſon; but the next ſummer, I found the effects of this watering to an inch in the ſaid meadow; the graſs being much thicker and higher than on any other part of the field. I conſidered this as proof poſitive, and determined in future to increaſe the quantity of my pond water. For this purpoſe I emptied the pond, enlarged it, and lined the bottom and ſides with clay eight inches thick, to prevent the water from ſoaking into the earth. I then laid covered drains into it from my ſtables, ox-ſtalls, kitchen, dairy, and neceſſary, (the latter I regularly emptied once a year into it) and threw in all the offal made in the houſe, cabbage leaves, rotten fruit, and the like; by theſe means, the water ſoon grew very putrid, and I had it in great plenty. In my garden I now uſed no other manure, and yet found the produce much ſuperior to my neighbours, who dunged ground equally good freely. Having a common water-cart made with a trough behind full of holes, I then watered my paſture and meadow lands with the greateſt ſucceſs. Twenty carts of this water on an acre in the beginning of May, and in July, would render my crops of graſs and rowen* far better than any manure I could lay on without it. After this ſucceſs, I tried it on arable, and found it equally ſerviceable on corn as on graſs-lands.

If relating my experience ſhould induce any of the weſtern farmers to follow my example, they will have no cauſe to repent their labour; and it will ſufficiently recompence me for the trifling taſk I have undertaken in communicating this to you.

I am, &c.

R. S.

W——, July 10, 1779.

ARTICLE XLV.

On the Management of CLOVER.

[By a Gentleman Farmer in Suffolk.]

GENTLEMEN,

AS Clover is a graſs which ſuits our climate better than almoſt any other, I think the proper cultivation of it an object of national importance; and therefore take the liberty of informing you, how I have for ſeveral years managed it with great ſucceſs.

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* Aftermath.

In April, after my barley is come up, I ſow about eight pounds of clover-ſeed per acre on it, and roll the land. This anſwers two good purpoſes, namely, preſſing and covering the ſeed, and fixing the roots of the barley more firmly, which, in a light ſoil eſpecially, is of great ſervice.

After the corn is reaped, I omit turning in any cattle till the crop of clover gets up pretty high and thick, which it will generally be by the end of October. I then turn in ſheep and other ſmall cattle for about a month, or, if the crop is large, ſix weeks. After this time, I let it remain unfed till April. My cattle are then turned in, which eat it off pretty bare by May, at which time I clear it for a crop of hay. If the ſeaſon is not remarkably dry, it will be ready for the firſt cutting by the middle of June, and generally yields me two tons per acre.

Experience has taught me, that the nearer the ground clover is cut the better, if it be cut early; but if it has ſtood too long, the bottoms of the ſtalks will be dry and naked.* In that caſe, it ought not to be cut ſo low, as the hay would be more ſticky and coarſe. If rain follows the firſt cutting, the ſecond crop will be ready about the 10th of September. The beſt time is when the flowers are all full blown, and the earlieſt begin to turn brown.

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* To this the writer might have added, that the ſtalk being drained of its moiſture, the root is alſo much exhauſted, and will require longer time before it ſends forth new ſhoots for a ſecond crop.

When I intend the ſecond crop for ſeed, I uſually let it ſtand till near October. This occaſions it to threſh the better, and there is no danger of the ſeed ſhedding in the field.

In order to prevent the inconveniences that ſeed clover is liable to in a wet autumn, I generally leave half my crop unfed in April, by which means it is fit for cutting near a month ſooner than it otherwiſe would be; and the ſecond, or ſeed-crop, is brought more into the ſummer. When the autumn proves wet, this method is attended with many advantages; the ſeed ripens better, and is threſhed with much leſs trouble and expence. The ſample is alſo better coloured, and the ſtraw being leſs beaten to pieces, makes better fodder for my cattle.

The beſt method I have ever found to prevent cattle from being hoved, as it is here called, or choaked, on their being turned into green clover, is to let them remain at the firſt no longer than till their bellies are full; and while feeding, to keep them conſtantly ſtirring. For as it is their greedineſs in ſwallowing the mouth-fulls too faſt, and before it is ſufficiently chewed, which occaſions theſe accidents; if they are interrupted every two or three mouth-fulls, ſo as to give time for the balls to ſink into their maw before the next follows, it will effectually prevent ſuffocation.— Whenever, notwithſtanding this precaution, any of my cattle have ſwelled, I have immediately opened a vein, and ſtabbed them in the flank near enough the hip-bone to prevent wounding the intrails. As ſoon as this was done, I put a quill or reed into the orifice to keep it open, that the wind might have a free paſſage out, and keep the animal warm till it recovered its breath. By this means I never loſt more than one, and that was occaſioned by the remedy being applied too late.

I am, &c.

W. E.

Near Halſworth, May 20, 1779.

ARTICLE XLVI.

Thoughts on the ROT *in* SHEEP.

To Mr. RACK, Secretary of the Bath Agriculture Society.

SIR,

THE great attention of the Bath Society to ſuch ſubjects as promote the public good, induces me to trouble you with a few looſe thoughts relative to a diſorder moſt fatal in an animal of vaſt importance to the "agriculture, "manufactures, and commerce of this kingdom."

The cauſe of the Rot in Sheep, ſays Mr. Boſwell, in his late ingenious Treatiſe on watering Meadows, is unknown.—Mr. Arthur Young, in recapitulating all the information he could get in his Eaſtern Tour, obſerves, that "the accounts are ſo amazingly contradictory, that nothing can be gathered from them," but concludes, that "*every one knows* that moiſture is the cauſe."

In differing from an author of Mr. Young's acknowledged merit, ſupported by the general opinion of mankind, I am led to examine my own ſentiments with caution and diſtruſt;—but, unleſs it is only meant, that moiſture is *generally the remote* *cauſe*, it will be difficult to account for the Rot being taken on fallows in a ſingle day, and in water meadows ſometimes in half an hour, when in grounds of a different ſort, although exceſſively wet and flabby, ſheep will remain for many weeks together uninjured.

Another opinion, which has many adherents, is, that the rot is owing to the quick growth of graſs or herbs that grow in wet places.

Without premiſing, that all-bounteous Providence has given to every animal its peculiar taſte, by which it diſtinguiſhes the food proper for its preſervation and ſupport, (if not vitiated by fortuitous circumſtances) it ſeems very difficult to diſcover on philoſophical principles, why the quick growth of graſs ſhould render it noxious,—or why any herb ſhould at one ſeaſon produce fatal effects, by the admiſſion of pure water only into its component parts, which at other times is perfectly innocent, although brought to its utmoſt ſtrength and maturity by the genial influence of the ſun. So far from agreeing with thoſe who attribute the Rot to quick-growing graſs, which they call flaſhy, inſipid, and deſtitute of ſalts, to me the quickneſs of growth is a proof of its being endued with the moſt active principles of vegetation, and is *one* of the criterions of its ſuperior excellence. Beſides, the conſtant practice of moſt farmers in the kingdom, who with the greateſt ſecurity feed their meadows in the ſpring, when the graſs ſhoots quick and is full of juices, militates directly againſt this opinion.

Let us now conſider whether another cauſe may not be aſſigned, more reconcileable with the various accounts we receive of this diſorder. If our arguments, however ſpecious, are contradictory to known facts, inſtead of conducting us in the plain paths of truth, they leave us in the mazes of error and uncertainty.

Each ſpecies of vegetables and animals has its peculiar ſoil, ſituation, and food, aſſigned to it. Taught by unerring inſtinct "the ſparrow findeth "her a houſe, the ſwallow a neſt, and the ſtork "in the heavens knoweth her appointed time."— The whole feathered tribe, indeed, diſplay a wonderful ſagacity and variety in the choice and ſtructure of their habitations. Nor can it be doubted that the minuteſt reptile has its fixed laws, appointed by Him whoſe "tender mercies are over "all his works."

The numerous inhabitants of the air, earth, and waters, are ſtrongly influenced by the ſeaſons; and by the ſtate of the atmoſphere; and the ſame cauſes, perhaps, that rapidly call myriads of one ſpecies into being, may frequently prove the deſtruction of another. Is it then improbable, that ſome inſect finds its food, and lays its eggs, on the tender ſucculent graſs found on particular ſoils, (eſpecially wet ones) which it moſt delights in? Or that this inſect ſhould, after a redundancy of moiſture, by an inſtinctive impulſe, quit its dank and dreary habitation, and its fecundity be greatly increaſed by ſuch ſeaſons, in conjunction with the prolific warmth of the ſun?

The fleſh-fly lays her eggs upon her food, which alſo ſerves to ſupport her future offſpring; and the common earth-worm propagates its ſpecies above ground, when the weather is mild and moiſt, or the earth dewy.

The eggs depoſited on the tender germ, are conveyed with the food into the ſtomach and inteſtines of the animals, whence they are received into the lacteal veſſels, carried off in the chyle, and paſs into the blood; nor do they meet with any obſtruction until they arrive at the capillary veſſels of the liver.—Here, as the blood filtrates thro' the extreme branches, anſwering to thoſe of the Vena Porta in the human body, the ſecerning veſſels are too minute to admit the impregnated ova, which, adhering to the membrane, produce thoſe animalculæ that feed upon the liver and deſtroy the ſheep. They much reſemble the flat fiſh called plaice, are ſometimes as large as a ſilver twopence, and are found both in the liver, and in the pipe (anſwering to that of the vena cava) which conveys the blood from the liver to the heart.

If the form of this animal is unlike any thing we meet with among the inſect tribe, we ſhould conſider that it may be ſo ſmall in its natural ſtate as to eſcape our obſervation.—Or might not its form have changed with its ſituation?—"The "caterpillar undergoes ſeveral changes before it "produces a butterfly."

The various accounts which every diligent enquirer muſt have met with (as well as the indefatigable Mr. Young) ſeem very conſiſtent with the theory of this diſorder.

If dry limed land in Derbyſhire will rot in common with water-meadows, and ſtagnant marſhes;

if ſome ſpringy lands rot when others are perfectly ſafe;—is it owing to the circumſtance of water, or that of producing the proper food or nidus of the inſect? Thoſe who find their after-graſs rot till the autumnal watering, and ſafe afterwards, might probably be of opinion, that the embryo laid there in the ſummer is then waſhed away or deſtroyed.

With regard to thoſe lands that are accounted neverſafe, if there is not ſomething peculiar in the ſoil or ſituation, which allures or forces the inſect to quit its abode at unuſual ſeaſons, it may be well worth enquiring, whether from the coarſeneſs of their nature, or for want of being ſufficiently fed, there is not ſome graſs in theſe lands always left of a ſufficient length to ſecure the eggs of the inſect above the reach of the water.

Such who aſſert that *flowing* water alone is the cauſe of the Rot can have but little acquaintance with the Somerſetſhire clays, and are diametrically oppoſite to thoſe who find their worſt land for rotting cured by watering. Yet, may not the water which produces this effect be impregnated with particles deſtructive to the inſect, or to the tender germ which ſerves for its food or nidus?

For ſolving another difficulty, "that no ewe "ever rots while ſhe has a lamb by her ſide," the gentlemen of the faculty can beſt inform us, whether it is not probable, that the impregnated ovum paſſes into the milk, and never arrives at the liver. The ſame learned gentlemen may think the following queſtion alſo not unworthy their conſideration :—

Why is the Rot fatal to ſheep, hares, and rabbits, (and ſometimes to calves,) when cattle of greater bulk, which probably take the ſame food, eſcape uninjured?

Is the digeſtive matter in the ſtomach of *theſe* different from that of the others, and ſuch as will turn the ova into a ſtate of corruption; or rather, are not the ſecretory ducts in the liver large enough to let them paſs through, and be carried on in the uſual current of the blood?

It ſeems to be an acknowledged fact, that ſalt-marſhes never rot. Salt is pernicious to moſt inſects. They never infeſt gardens where ſea-weed is laid.* Common ſalt and water is a powerful expellent of worms bred in the human body.

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* And yet ſea-weeds, ſteeped a few days in the pureſt ſpring water, abounds with animalculæ of various ſpecies.

I could wiſh the intelligent farmer would conſider theſe truths with attention, and not neglect a remedy which is cheap and always at hand.

Lysle, in his book of huſbandry, informs us of a farmer who cured his whole flock of the Rot, by giving each ſheep a handful of Spaniſh ſalt, for five or ſix mornings ſucceſſively. The hint was probably taken from the Spaniards, who frequently give their ſheep ſalt to keep them healthy.

On ſome farms, perhaps the utmoſt caution cannot always prevent the diſorder. In wet and warm ſeaſons, the prudent farmer will remove his ſheep from the lands liable to rot. Thoſe who have it not in their power to do this, I would adviſe to give each ſheep a ſpoonful of common ſalt, with the ſame quantity of flour, in a quarter of a pint of water, once or twice a week. When the rot is recently taken, the ſame remedy given four or five mornings ſucceſſively, will in all probability, effect a cure. The addition of the flour and water will, in the opinion of the writer of this, not only abate the pungency of the ſalt, but diſpoſe it to mix with the chyle in a more friendly and efficacious manner.

Were it in my power to communicate to the Society the reſult of actual experiment, it would doubtleſs be more ſatisfactory. They will, however, I am perſuaded, accept of theſe hints, at leaſt as an earneſt of my deſire to be ſerviceable. Should they only tend to awaken the attention of the induſtrious huſbandman, or to excite the curioſity of ſome other enquirer, who has more leiſure and greater abilities, I ſhall have the ſatisfaction of thinking that my ſpeculations, however imperfect, are not entirely uſeleſs.

I am, Sir,

your very humble ſervant,

BENJAMIN PRICE.

Saliſbury, Dec. 3, 1779.

ARTICLE XLVII.

On the Mode of Cultivating and Curing the RHEUM PALMATUM, *or true Rhubarb.*

GENTLEMEN,

AS the true Rhubarb of the ſhops is a very valuable drug in medicine, and, conſidered as an article of foreign commerce, very expenſive; I would

I would beg leave to propoſe to the Society at Bath, that they endeavour to encourage its cultivation in this country, by offering a premium to the perſon who ſhall raiſe the greateſt quantity of the beſt kind, and cure it in ſuch a manner as to render it equal in quality to that annually imported from abroad. It is a plant to which our climate is not unfriendly, and it may eaſily be cultivated with ſucceſs.

I had laſt ſummer ſome plants of it in my garden, which were very vigorous, riſing to the height of eight feet. The roots weighed from eight to twelve pounds, and when cured, the quality was allowed by the faculty to be equal to that of the Turkey Rhubarb.

But to give an opportunity for the medical gentlemen of Bath to examine and aſcertain its quality, I herewith ſend you a ſpecimen of the cured root, and a quantity of the ſeed in good preſervation, for ſuch perſons as may chuſe to cultivate it.

As to the culture of this plant, my knowledge has been chiefly acquired by my own experience; and that it may become an uſeful article of agriculture

culture and commerce is, I think, not a very hazardous preſumption.

The ſeeds, ſown upon a very gentle hot-bed in March, readily vegetate; and when the roots are about the ſize of a crow's quill, they ſhould be carefully drawn up to preſerve the tap-root, and planted in fine rich earth in a deep ſoil; and if the weather ſhould prove dry, they muſt be watered. When the plants are once in a growing ſtate, all further care and trouble, but that of keeping them free from weeds, is at an end.

The diſtance of the plants from each other ſhould be eight feet; and as they diſappear about ſeven months in the year, in this interval the ground may be uſefully employed in many articles of gardening, from the middle of Auguſt to the beginning of April.

I am of opinion, the ſeeds will grow in the natural ground, if ſown in a good expoſure; but this I have not tried. It is, however, a little remarkable, that although innumerable ſeeds fall annually into the ground, I never perceived a ſingle plant to grow ſpontaneouſly.

The ſeed which I now preſent to the Society will afford opportunities for making various experiments, from whence ſome certain principles may be drawn. The beſt ſeaſon for taking up the root for curing is, I think, when and as ſoon as the ſtem and leaves decay. If taken up in the ſpring, it is ſo ſucculent as to be dried with difficulty, and I believe loſes a good deal of its reſinous particles by the glutinous juice that iſſues from it.

The ſpecimen ſent herewith is from a root of ſix or ſeven years growth, taken up about a month ſince. It ſhould, on taking up, be divided into proper parts, and the outer rind ſliced off, then hung on a ſtring expoſed to ſun and air, and defended from wet. Each piece ſhould hang ſeparate from the other, and care ſhould be taken that it does not grow mouldy. When hardened on the outſide, let it be removed to the corner of a kitchen chimney, where a moderate fire is conſtantly kept, till it is perfectly dry. It may then be raſped, and all the diſcoloured outſide taken off.

I am convinced that the older* the plant is, the better the quality will be; for although it may

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* See ARTICLE XLIX.

have great virtues at four or five years growth, and may attain to upwards of twenty pounds weight when green, yet the root will be horny and flinty when dried, and not of that woody fine texture or appearance which it acquires at a more mature growth.

The ground on which mine was raiſed is a garden; the ſoil deep and fertile, but has not had any ſort of manure ſince the ſeedling plants were firſt raiſed.

I would juſt add, that this plant does not ſeem fitted by nature for tranſplanting; and if it ſhould be found capable of being raiſed in the natural ground, I think it would thrive much better.

If ſome ſuch method as the following were tried, it might anſwer:—After marking out the ground at proper diſtances, take out the earth twelve inches deep and eighteen diameter; let the ſaid earth be ſifted and put in again looſely, then ſow a few ſeeds thereon, and cover each plat with a hand-glaſs. If they ſucceed, the moſt central plants may be left to ſtand, and the reſt drawn up.

I am, &c.

Minehead. R. D.

ARTICLE XLVIII.

On the Cultivation of RHUBARB.

[By a Gentleman near Norwich.]

GENTLEMEN,

I AM greatly obliged to you for the favour of your letter, incloſing ſome ſeeds of the Rheum Palmatum, together with the directions ſent by your ingenious correſpondent at Minehead;* in return for which I have tranſcribed and ſent you thoſe which I ſome time ſince received from a gentleman who has reſided many years in Ruſſia, and who aſſured me he received them from the late Dr. Mounſey, who was archiater to the Empreſs, and who had conſtantly followed the method here directed in that country. The Doctor's words are theſe:—

'The proper time for planting the ſeeds of the 'Chineſe, or the Turkey Rhubarb, is in April or 'May: they may be planted in flower-pots, three 'or four ſeeds in a pot, and plunged in a hot-bed 'until the ſeeds vegetate. When the plants are 'about two months old, let them be tranſplanted 'into the place where they are to remain, which

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* See preceding Letter.

'ſhould be in a fine light ſoil. It may not be improper to keep ſome of the plants in the pots till October, and ſome till the ſpring following, and then plant them out as above. When by theſe precautions you have ſecured a ſufficiency of plants, you may afterwards venture to ſow your ſeeds in the open air, as I have conſtantly done with ſucceſs. If the ſeeds vegetate late in the ſeaſon, they ought to be covered with mulch or moſs, to preſerve them in winter. When tranſplanted, ſet them at leaſt four* feet aſunder in the quincunx order, or in ſquare rows; hoe them and keep them clean from weeds, and let the ground between each row be turned up yearly, taking care not to touch the roots. In the ſecond or third year, the plants will begin to bear ſeeds, which you may ſow at various times after their maturity, till you find which ſeaſon ſuits them beſt. The earlieſt period at which the roots are uſeful, is at four years' growth, but even then they will be ſoft and ſpungy. So that unleſs for curioſity, or through neceſſity, they ſhould remain

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* This, in our climate, is not a ſufficient diſtance—they ſhould be eight feet apart; and even then, if the plants are ſtrong and vigorous, the leaves will meet each other. This we aſſert from our own knowledge; and are of opinion, that in a rich ſoil, if they were left ten feet apart, the roots would be ſtill larger and better.

‘ eight years undiſturbed,* although ſtill more ‘ years will add greatly to their perfection. The ‘ roots are to be taken up in autumn after the ‘ ſtems and leaves are withered and decayed, but ‘ the planter may take them up in every ſeaſon of ‘ the year, when he has a ſufficient number, as it ‘ is uncertain at which ſeaſon the roots will prove ‘ moſt ſolid. Upon taking them up, ſplit them ‘ into two or three pieces, and hang them upon ‘ cords or rods in a kitchen or room with a ſtove ‘ in it, that they may dry with a gentle heat.’

Thus far Dr. Mounſey.

Some few gentlemen in Norfolk have, for their amuſement, cultivated Rhubarb; they have planted the Rhaponticum, the Palmatum, and the Compactum, and managed their plants very much as above directed. A near relation of mine, who is a phyſician, has uſed the Rhubarb of his own growth ſome time, and pronounces it as good as any foreign Rhubarb. He had ſome plants of the palmatum and compactum ſtanding ſo near together, four or five years ago, that the ſeeds ſaved from them produced only *mule* plants, the roots of which, he believes, will prove as good and efficacious as thoſe of the beſt original plants. They are now growing in his garden within a mile of Norwich.

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* We apprehend that this part of the Doctor's direction muſt have been occaſioned by the difference in climate between England and Ruſſia. The latter is not ſo favourable to vegetation as the former. Perhaps four years here may bring this plant to as high a ſtate of maturity as eight in Ruſſia; and we are the more induced to think this is the caſe, from having ſeen plants raiſed in this country, the roots of which when properly cured, at four years' growth, were equal in quality to Turkey Rhubarb.

The following is his account of the diſcovery and introduction of the different ſorts into medicine; which I flatter myſelf may not be unacceptable. ‘The Rhapontic was the *rha* or *rheum* of Dioſcorides, and all the antient Greeks and Romans. ‘The Turkey and India kinds were utterly unknown to them. The Rhapontic was long ſuppoſed to be the true Rhubarb, till the diſcovery of the *Undulatum* about eighty years ſince; which was looked upon to be the true officinal Rhubarb for half the preſent century. It was then diſcarded for two competitors, the *Palmatum* and the *Compactum*, to both of which the preference has been given by different perſons. Linnæus aſſerts the Palmatum to be the true Turkey Rhubarb; Mr. Miller the Compactum.’

I have now about twenty plants of the Rheum Palmatum of one year's growth only. They were raiſed in a box of good moulds, ſet upon one of the borders in my garden, and planted out at two months old where they are to remain. They appear to be ſtrong and vigorous. I have alſo ſome from the ſeed ſent me by your Secretary; and others from a friend in Ruſſia, ſown in the open ground, where I have no doubt of their coming to perfection.

I am, &c.

Sept. 16, 1778.

ARTICLE XLIX.

On the Cultivation and Cure of the True RHUBARB.

GENTLEMEN,

PERUSING the Farmer's Magazine for September, I was much pleaſed with ſome judicious remarks on the cultivation of the Rheum Palmatum, made, I think, by a gentleman at Minehead. With the utmoſt deference and reſpect to that gentleman's abilities and experience, I beg leave to ſubmit the following obſervations, relating to the culture of that valuable plant, to your conſideration; which may be depended on as facts, proved by myſelf and others from long experience.

The ſeeds of this plant do not require any hot-bed to make them vegetate; but if ſown in the natural ground in the ſpring, when the weather is open, ſoon come up and thrive very faſt. It delights moſt in a rich, light, deep ſoil, and warm expoſure; but will thrive in almoſt any ſoil or ſituation. If the roots be covered with litter, or the earth be drawn over them in winter, they will riſe the ſtronger in the following ſpring. The ſeeds ſhould be ſown where the plants are to remain; and when they appear, the ground ſhould be kept clean from weeds. When thinned out, the diſtance from plant to plant ſhould be eight feet.

The above is all that is neceſſary to be underſtood by thoſe who wiſh to cultivate this plant in perfection.

As to *curing* the root for medicinal uſes, I muſt own myſelf a novice in the art, this being the firſt year I ever attempted it; and my roots being dry, I cannot with any preciſion ſay how they will turn out; but ſubmit the following hints to your conſideration :——

To have the root of a fine cloſe grain or texture, drying it gradually ſeems to be eſſentially neceſſary. I take mine up, clean it from all dirt, and lay it in the ſhade, under a ſhed for two or three days, where, without becoming ſhrivelled, it will loſe by degrees the exuberant moiſture it had when recent from the earth. If it be expoſed too ſuddenly to heat, either natural or artificial, or a very drying air, the root grows wrinkled, and is always horny or flinty. Herein lies the chief difficulty; for after it is once well preſerved thus far, it is ſafe: you may afterwards finiſh the proceſs of curing, ſo it be done gradually, in any manner you may chuſe, with ſucceſs.

I cannot hold with barking or ſlicing the root, becauſe, by the too eaſy admiſſion of ſun or air, great part of that reſinous and glutinous matter, which I apprehend to be the richeſt part of the root, is drained off and evaporated; and which, under cover of the bark, would by degrees condenſe and harden with the root itſelf. You will therefore, I am ſatisfied, find roots ſo cured to be of a much better texture, and richer quality, than thoſe that are barked. The older the root, the better it is for curing.

I am, &c.

G. P.

Oct. 17, 1778.

P. S. I forgot in its proper place to inform you, that that part of the root (for there are ſeveral buds, or eyes, which will bloom in future) from whence the main or any flower ſtem iſſues, on perfecting its ſeed, immediately, or at leaſt very ſoon after, begins to decay, and leaves the other buds ſound, ſome or one of which will bloom the following ſeaſon, according to their maturity. This is an undoubted fact; and therefore, although the older the root is, the better it will be for curing, yet when it has paſſed its meridian, that propoſition muſt be erroneous.

It is therefore my opinion, that the moſt proper time to take up the root for curing will be immediately on its perfecting the ſeed from its main or flower-ſtem, and to preſerve *that part only*, every ſeaſon, and to plant the buds with their reſpective roots again.

ARTICLE

ARTICLE L.

On the Cultivation and Cure of the True RHUBARB.

[LETTER II. by G. P.]

GENTLEMEN,

YOUR Secretary's remarks on my objection to the ſlicing of the roots of Rhubarb when taken up to dry, ſeem very juſt: but give me leave to obſerve, that on my cutting the root, a quantity of matter, of the conſiſtence of melted glue, iſſued from it, which, after the aqueous particles were extracted, hardened, and formed a gum or reſin.

Query, Whether it is not neceſſary to preſerve as much as poſſible of this ſubſtance with the root, as poſſeſſing a quality equal, if not ſuperior, to the root itſelf? And allowing the root to be cut in lengths, but not barked or ſliced, (which was my meaning*) would not a great deal of that reſinous matter be thereby preſerved; and would not the admiſſion of air and ſun, at the extremities of ſuch pieces only, be ſufficient to extract the aqueous particles, and to purify and concoct the juices?

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* See Page 198.

As to his ſecond remark, (on the decay of that part of the root from which the flower-ſtems ariſe) he might poſſibly have never made the obſervation. This is the firſt time of my obſerving it, though I have at divers times heard it atteſted by thoſe who have experienced it. In the ſpecimen I ſend you, the ſide-bulbs are apparent, and the main root in a ſtate of decay.

It ſeems to me that this plant, like many other perennials, upon its firſt bloom, exhauſts (if the bloom be ſtrong) its vegetative principle in that part. I am ſenſible the root cannot be cured without ſhrinking conſiderably, and it always appears much ſhrunk when cured with the bark on. If it be expoſed to heat, or a drying air, when firſt taken up, it will ſhrivel very much, and be horny; to prevent which, I adviſed laying it in the ſhade, or under cover.

I am, &c.

G. P.

ARTICLE LI.

Reply to ſome Enquiries relative to the true RHUBARB.

[By Dr. JOHN COAKLEY LETTSOM, F. R. S. S. S.]

GENTLEMEN,

THERE is every reaſon to conclude with Linnæus, that the Rheum Palmatum is the Turkey or Ruſſia Rhubarb.

The root is perennial, but throws out annually, from its crown and ſides, new ſhoots or bulbs, which flower and decay in ſucceſſion.

It may probably be of little conſequence, as to the vigour of the roots, whether they are taken up in ſummer or autumn; but as warm weather is beſt for drying them, the former ſeems moſt eligible.

The roots, if large, ſhould be ſliced, ſo as to admit of a free exſiccation.

I believe Rhubarb delights in a ſandy ſoil, on a ſomewhat elevated ſituation; ſuch a ſoil as carrots will flouriſh in.

Dr. Hope, of Edinburgh, has paid great attention to this exotic, and is very capable of giving its hiſtory, a very eſſential part of which, [i. e. its medicinal powers] are yet uneſtabliſhed;—to him, therefore, I refer you.

And am, &c.

J. C. LETTSOM.

London, Nov. 21, 1778.

ARTICLE LII.

Anſwers to Queries from the Bath Society reſpecting RHUBARB.

[By Dr. HOPE, of Edinburgh.]

GENTLEMEN,

1. THE Rheum Palmatum is the Turkey, or Ruſſia Rhubarb. The Indian Rhubarb is the root of another ſpecies, or variety.

2. I believe your obſervation reſpecting the root dying at four years old to be well founded; and, therefore, it ſhould be raiſed at that age.

3. I am of opinion, that the entire root ſhould be hung up in the open air for two, three, or more

weeks, and thereafter cut into marketable pieces before it be put into the drying.——N. B. The cuticle ſhould be rubbed off as ſoon as poſſible.

4. The ſucculent root is more purgative than the dried, therefore the more recent the better.

5. A ſoil that is fit for carrots will ſuit Rhubarb. It is believed that the roots raiſed in a dry ſoil are preferable to thoſe raiſed in a moiſt one.

6. The ſeaſon for taking up Rhubarb is from the end of July to the firſt of January; it ſhould be taken up after the weather has been ſome time dry.

7. I know nothing to prevent its being tranſplanted.

I have the honour to be,

your moſt obedient ſervant,

JOHN HOPE.

ARTICLE LIII.

On the Growth and Application of RHUBARB.

[By a Gentleman near Norwich.]

GENTLEMEN,

I Herewith incloſe you an account of the growth and application of ſome Rhubarb, ſent to me by a particular friend, who is a phyſician of very extenſive practice, and on whoſe accuracy and integrity I can fully rely; in which you will perceive his experiments, as to the weight and ſize of the roots, entirely militate with the idea one of your correſpondents adopted; 'that in conſequence of the annual decay of that part of the 'root which correſponds with the flowering ſtem, 'the roots are in fact never more than four years 'old, that being the uſual time of their flowering.'

For this difference of opinion, if I may hazard a conjecture, I ſhould endeavour to account, by ſuggeſting, that although that part of the bulb or root from which the flower-ſtem ariſes may decay, yet that the fangs or tap-roots of the plant do not decay with it, but increaſe annually for ſeveral years. My friend the phyſician has, you will obſerve,

ſerve, an idea of its becoming uſeful as a dye, which is, I believe, new, and may, if properly purſued, prove of much importance; but take his account in his own words :——

"In the ſummer of 1771, I had a plant of the true Rheum Palmatum, in great vigour and in full flower, growing at the diſtance of about four yards from a plant of the Rheum Compactum, which was likewiſe at the ſame time in flower. As the firſt was the plant generally allowed to be the true Turkey Rhubarb, I carefully collected and preſerved the ſeeds of it, which I ſowed early in the ſpring of the year 1772, in a bed of common light earth, about half an inch deep. In about five weeks, the plants appeared in great plenty, and were, in the beginning of the winter following, thinned, and tranſplanted at the diſtances of ſix and ſeven feet from each other. The plants were healthy and ſtrong, although they had no particular care or attention paid to them.—But what ſeemed moſt remarkable in them was, that the leaves were neither thoſe of the Palmatum or Compactum, but a perfect mixture of both; very large and broad like the Compactum, but terminating in long ſharp points, and in ſome degree indented, and reſembling the Palmatum. In the ſummer 1775, they were all in flower, the ſtems being ſix and ſeven feet high: when their ſeeds were ripened, they were carefully gathered, as they have been every year ſince, and regularly and conſtantly ſowed every ſpring, but without having ever produced a ſingle plant. Many botanical gentlemen have viewed theſe plants, and all pronounced them to be mule plants, betwixt the Palmatum and Compactum ſpecies.

"In the winter 1776, I took up a root of theſe plants ſown in 1772, and laid it in a ſouth window to dry. It had ſeveral long perpendicular pyramidal roots, about nine inches in length, and better than half an inch in diameter. They ſhrunk very much in the winter, but were in the ſpring ſufficiently dry to be reduced to powder. I gave different doſes of it to divers perſons with all the good effect of very mild Turkey Rhubarb, altho' the quantity was nearly doubled. In the beginning of the winter 1777, I took up another root; the increaſe of the ſize and quantity of roots was then very great. The weight of the root taken up in 1776 was only between eight and nine pounds; that of 1777 weighed full fourteen pounds: this root dried better, ſhrunk leſs, and in every reſpect, when dried and prepared, reſembled more the true

Turkey Rhubarb. The effects were likewiſe produced by much ſmaller doſes; but it was not altogether ſo purgative as the Turkey Rhubarb of the ſhops. I gave to two or three perſons this root in its freſh ſtate, that is, *undried*; directing them to bruiſe about half an ounce, and boil it in half a pint of water, till reduced to one quarter of a pint. This had all the good and ſimilar effects with the true ſhop Rhubarb, inſomuch, as I am greatly inclined to think, that the green root of the Rheum Palmatum may be uſed with ſafety and effect. This root, when dried and prepared, yielded a good quantity of well-looking Rhubarb, which, when powdered, had all the appearance of ſhop Rhubarb, but was milder and more grateful to the taſte. I took once a doſe of this Rhubarb myſelf, for a complaint in my ſtomach, for which I had always before taken Turkey Rhubarb, and found exactly the ſame relief I had uſually received, only with a leſs purgative effect in the bowels.

"In the beginning of this preſent winter 1778, I have taken up two more roots; the one weighed eighteen, the other twenty-one pounds, and I have little doubt of their virtue and efficacy having been improved as well as their ſize and quantity increaſed; and I am of opinion, they will continue ſo to do in all the above reſpects for two or three years longer. Eight years old, I am inclined to think from ſome obſervations, is the meridian of their perfection. In theſe mule plants, produced without doubt from the farina of the Palmatum and Compactum intermixing with each other in 1771; the root does not appear to have been at all affected either in effect or appearance, having accurately compared it with that of the genuine Rheum Palmatum. I tried theſe roots both freſh and dried with the ſhop Rhubarb, by an experiment of another kind. I infuſed them in a portion of water, and to the infuſion, when ſtrained, I added a few grains of ſalt of tartar, whereby I obtained a very beautiful red tincture, ſuch as would be valuable for the purpoſes of dying a colour which at this time is ſo very expenſive, and which, by this means, may probably be amply provided for by the uſe of this root when it is more generally cultivated, as with very little trouble and expence it may be. The ſoil in which my plants were raiſed is very light for about twelve inches deep, under which there lies a ſtratum of red ſand of great depth."——Thus far the Doctor.

I am, Gentlemen, your's, &c.

Dec. 7, 1778.

ARTICLE LIV.

On the Extirpation of Plants noxious to Cattle on Dairy and Grazing Farms; and the Cultivation of ſuch as are wholeſome and nutritive recommended: with ſome Hints on the breeding and rearing Milch Cows.

[Communicated to the Society by Mr. *Benjamin Axford.*]

GENTLEMEN,

THERE is no branch of agriculture which to me appears more important in itſelf, or to open a larger field for improvement, than the conducting and management of Dairy Farms. This will be very evident, when we conſider it as a fact, that the health and good condition of milch cows, and all grazing cattle, depend in a great degree on the conduct and care of the farmer, in keeping his paſture-lands clear from weeds and plants of a noxious quality, and in ſtocking them with ſuch as are healthful, ſalutary, and medicinal.

But the moſt eſſential and weighty conſiderations are, that the health and lives of mankind are, in ſome meaſure, dependent on the health and good condition of milch cows; milk being a vegetable juice, partaking more or leſs of the good or bad qualities of the plants on which cows feed.

Milk, and its produce, in cream, butter, cheeſe, and many of our luxuries, are conſtituent parts of our daily food, from the earlieſt to the laſt ſtage in life; conſequently, great care ought to be taken with reſpect to the food of animals, who furniſh us with ſo great and neceſſary a part of our ſuſtenance.

Granting the above premiſes, it is humbly conceived, that the attention of the Bath (and every other) Agricultural Society, cannot be employed in any purſuit that tends more to the intereſt and health of mankind, than the increaſing the quantity, and improving the quality of cow's milk. The taſk may be arduous, but in proportion to the ſucceſs attending their endeavours will be the reward.

That cows are frequently diſeaſed, is a well-known fact: and, I believe, moſt gentlemen who keep cattle are convinced, that the diſeaſes generally proceed from unknown cauſes. Few dairies of cows remain a ſummer all healthy. Among many inſtances that might be adduced, I will mention one, which, in the ſummer 1777, came within my own obſervation. I was witneſs to the loſs of five cows, out of a dairy of only thirteen; and the moſt noted Cow-Leaches could not diſcover, or even gueſs at the diſeaſe or its cauſe.

I have alſo reaſon to believe, that the milk of diſeaſed cows is too often mixed with the reſt, and made into butter, cheeſe, &c. If then it appears, that numbers of cows are diſeaſed, and die annually, without the nature or cauſe of the diſeaſe being diſcovered; and of diſeaſes to which this ſpecies of animals are not naturally ſubject, I preſume it will be moſt reaſonable to ſearch for that cauſe in their food.

On inſpecting paſture and meadow-lands in general, many noxious and poiſonous plants will be found, and ſometimes in conſiderable quantities. Of theſe kinds are, among others, the following: henbane, hemlock, the aconite, or deadly nightſhade, and ſeveral ſpecies of dropwort; which, if taken in with their food by cows, &c. will generally cauſe diſeaſe, and ſometimes death.

I am aware of the objection that may be made to this ſuggeſtion of danger to cattle from noxious plants, i. e. that *inſtinct* is a certain guide to almoſt every ſpecies of animals in the choice of their food. This is generally, but not unexceptionably, true. If cattle were at liberty to rove at large over extenſive tracts of paſturage, with a plenty always before them to chuſe out of, there would be little danger; but when herds of them are confined within narrow incloſures, where ſuch noxious plants abound, and kept there till little that is green remains, I think it almoſt impoſſible but that ſome of the cattle muſt be diſagreeably affected by ſuch plants when they are eaten.

In proportion then as paſture-lands are cleared of theſe and other noxious plants, the danger is leſſened; and a conſiderable advantage will be derived from ſuch lands being, by this means, rendered capable of producing a larger quantity of wholeſome herbage.

All neat beaſts have a natural tendency to ſcouring and flautulent diſorders. It is therefore a duty of the greateſt importance to the farmer, to ſow and plant in his paſtures and hedges ſuch herbs, in proper quantities, as are found to be the beſt remedies for theſe and ſuch other complaints as cattle are moſt incident to. Among many that might be mentioned, the following herbs are very ſalutary; lovage, agrimony, carraway, and cummin.

The general produce of ant-hills in this country has often been (through miſtake) ſuppoſed to be wild thyme; and as this herb is ſalutary in its nature, farmers have ſuffered theſe hills to remain in their paſtures, from an apprehenſion that they furniſhed a medicinal repaſt to their ſheep and cattle. But on a careful examination, any perſon may be convinced, that, in general, the produce of ant-hills is, a *little* of the wild thyme, (which I never obſerved to be touched by cattle) and a much larger quantity of poor ſmall ruſhy ſour graſs, which is a very pernicious kind of food both for cows and ſheep. The extirpation of ant-hills is, therefore, an eſſential part of good huſbandry. If the contents of them are mixed with lime and mulch (long dung) to rot, they make an excellent compoſt for the ſame or any other land that wants manuring; and this method will prevent the ants from bringing it in heaps again, which they are known to do when the hills are only levelled by ſpreading the earth round them. The bare places left by the removal of ant-hills, are very proper for ſowing the medicinal herbs and plants above-mentioned, or the ſmall Dutch clover, marl-graſs, &c. which will ſpread in and greatly improve the land at a ſmall expence.

To perſons unacquainted with agriculture, or who have not conſidered the above matters, this eſſay may appear frivolous and unintereſting; but thoſe who have obſerved the impropriety and bad huſbandry of ſuffering ſuch plants to grow on their lands as ſhould not be eaten, or if eaten will injure the farmer's intereſt, by hurting his cattle, will admire, that ſuch indolence and extreme inattention ſhould ſo generally be found amongſt us. To ſuch, it will appear an extraordinary act of negligence, to ſuffer-paſture-lands to remain overrun with hemlock, thiſtles, docks, ruſhes, &c. and our hedges and ditches filled with poiſonous plants of ſeveral ſpecies. Equally ſurpriſing will the inconſiderateneſs of farmers appear, in ſuffering ſuch quantities of nettles, thiſtles, &c. to remain on the ſides of our public roads, till their ſeeds ripen and are carried by the winds into all the adjacent fields, where they produce moſt plentiful crops the ſucceeding ſpring.*

Cattle, when confined in ſuch foul incloſures till their food becomes ſcanty, will, (as before obſerved) through hunger, devour a conſiderable part of ſuch noxious plants with the reſt of the herbage.

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* We cannot help expreſſing our entire concurrence with Mr. Axford's obſervations on this head. The evil he complains of is ſo great and ſo general, that it cannot be too much expoſed or cenſured. In vain may the farmer clean his fallows, or hoe his crops; while this remains, all his labour will be loſt—all his care ineffectual.

Obvious as theſe inſtances of bad management, and the many diſadvantages attending them, are, the greateſt difficulty ſeems to be, that of making farmers in general ſo ſenſible thereof as to induce them to purſue the above eaſy plan for redreſſing and removing them. I think it is out of the reach of premiums; but perhaps ſome honorary reward might ſtimulate the more intelligent to undertake ſo neceſſary a work; and I am of the opinion, that if a few would ſet the example, others would ſoon follow, and in time it might become general.

Some Gentlemen farmers are very curious in the breed of cows, and management of their ſtock on dairy farms. Such will, doubtleſs, improve on any hints that may be communicated through the Bath Society.

Much depends on the choice of cows, and the care taken to mend their breed, and increaſe their milk. Cows of a red and black colour are preferable to white, of which not more than one ſhould be admitted in a dairy. Heifers, intended for breeding, ſhould not be bulled till the fourth year. The third, fourth, and fifth calves are the moſt robuſt, and of courſe the beſt to breed from.

A bull ſhould be well fed, and kept from coition at leaſt till the ſecond, if not till the third year. His vigour laſts only two years.

In the choice of cows to breed from, ſee that they have eight or ten white teeth in their jaw, that the breaſt be broad, the tail long, the veins of the belly diſtinguiſhable, the brace of the navel large, a broad forehead, large black eyes, wide noſtrils and ears.

The ſeeds eſteemed the moſt ſalutary in promoting an increaſe of milk, are thoſe of trefoil, ſaintfoin, angelica, pimpernel, cummin, and aniſe. About the walls of houſes, and on the inſides of hedges, ſow lovage.

Since the foregoing remarks were written, a work, called MINUTES OF AGRICULTURE, has come under my notice, and ſerves to confirm my ſentiments of the great benefit that would ariſe from clearing paſture-lands of noxious weeds, and ſtoring them with ſuch as are ſalutary and medicinal. The writer of this work ſays, that "on the "29th of Auguſt a cow died of the red water, and "that on opening her, the maw was full of half-

"digeſted vegetables, although ſhe had not eaten "for many days." Again,

"Auguſt 17, 1775, an ox died ſuddenly in a "field that had been eaten down. The farmer "could not account for it."

"December 4, two oxen and one cow died with "ſcouring; one ox blowed; two bulls ſurfeited; "and one cow had the red water: all died, and "the writer cannot account for the diſeaſes."

ARTICLE LV.

Account of the Culture of CARROTS; *and Thoughts on Burnbaiting on Mendip-hills.*

[In a Letter to the Secretary.]

SIR,

IN purſuance of the directions of the Society, I herewith tranſmit particulars of the culture, expences, and produce of my carrot crop, which you lately did me the favour of inſpecting.

From a hearty wiſh to promote the public-ſpirited deſigns of that moſt laudable inſtitution, I have

I have taken the liberty to annex a few remarks on the comparative advantages of liming and burnbaiting, in reſpect to the ſoil of the new incloſures on Mendip-Hills.

As the ſpirit of cultivating theſe waſtes ſeems to overcome every obſtacle, and as a knowledge of the inefficacy of burning may prevent much uſeleſs expence, I truſt theſe few hints, drawn from real experience, will not be thought trifling or unimportant.

The field in which my carrots were raiſed was a few years ago part of the foreſt of Mendip. It contains eight acres: the ſoil a gravelly loam, of a good depth.

In the year 1776, it received an ample manuring with lime, (about twenty quarters per acre) and was ſown with turnips; in 1777, with barley; in 1778, it was again manured with horſe-dung, to the amount of fifteen cart-loads per acre, and planted with the large Scotch cabbage. The produce of this crop was very great, being more than thirty tons per acre, and the ſtock I maintained with them would aſtoniſh the farmer unaccuſtomed to the cultivation of this plant. And here I cannot forbear recommending, in the warmeſt manner, the culture of this cabbage (in conjunction with turnips) to every ſpirited Agriculturiſt, and particularly to thoſe who keep large flocks of ſheep. Every perſon in that branch of farming muſt have frequently experienced, during ſevere froſt, and deep ſnow, great difficulty in getting at his turnips. Now, this inconvenience would be entirely obviated by his poſſeſſing three or four acres of this plant. For their height and hardineſs render them acceſſible and ſound at all times, and in the moſt ſevere ſeaſons. I will not ſay that the produce will be equal in weight to a well-managed crop of turnips, but will be bold to affirm, that one hundred pounds of Scotch cabbage will go as far, in keeping or fattening horned cattle, as one hundred and fifty pounds weight of turnips.——But to return:

In the ſpring 1779, I began preparing for my carrot crop. Particulars as follows:

		£.	s.	d.
Feb. 15.	Firſt ploughing acroſs the ridges of the cabbages, 4s. per acre -	1	12	0
March 1.	Firſt harrowing, 9d. per acre -	0	6	0
April 15.	Second ploughing, 4s. per acre -	1	12	0
20.	Second (buſh) harrowing, 9d. per acre - - - - - - - - -	0	6	0
		3	16	0

		£.	s.	d.
	Brought over - - - -	1	18	0
	30 lb. red Sandwich carrot ſeed, at 1 s. per pound - - - - - -	1	10	0
24.	Sowing by hand in drills, one foot apart, and covering the ſeed, 13s. per acre - - - - - - - -	5	4	0
June 4.	Hand-hoeing and thinning, 20s.	8	0	0
October.	Digging up, 30s. - - - - - -	12	0	0
	Carting home, cutting off tops, and ſecuring - - - - - -	10	0	0
	Rent of land - - - -	8	0	0
		48	10	0
The produce was 640 ſacks, of 4 buſhels each, valued at 3s. a ſack - - - - - - - -		96	0	0
Each ſack weighed upwards of 200 pounds.				
	Nett profit of the crop	£.47	10	0

Or nearly 6 l. per acre. Quantity of carrots, 8 tons per acre.

From experiments which I have made, I am fully perſuaded that carrots are worth more than three ſhillings per ſack, in fattening hogs.

I will now proceed to give proof of the inefficacy of burn-baiting when applied to the ſoil of Mendip-hills, drawn from real experience, and deſigned as a caution to thoſe who may be diſpoſed to adopt this mode of improvement.

Having frequently met in different authors, with the moſt flattering and encouraging accounts of this plan of cultivation, and alſo been an eye-witneſs of very large crops procured thereby, on *black moory* ſoils, I formed a reſolution of trying the effects of the aſhes thus procured in compariſon with lime. For this purpoſe, I ſelected a field in which there was no apparent variation of ſoil. As it was a new incloſure, and had never been ploughed, the furze, fern, &c. with which it abounded, added to the turf, furniſhed more than three hundred buſhels of very fine aſhes.

I then divided the field, and ſpread the three hundred buſhels on half of it, fully expecting the moſt beneficial effects from ſo ample a manuring. On the other half of the field I ſpread four hundred buſhels of lime, and ſowed the whole in one day with wheat.

On the coming up of the wheat, I was very attentive to the field, and not a little ſurprized to ſee the limed part aſſume the moſt lively and healthful verdure, whilſt the other part appeared very weak and languid, inſomuch that the difference was perceivable at a mile's diſtance.

The limed part maintained its ſuperiority from that time to harveſt; and on threſhing, I found the produce of the limed part to be twenty-four buſhels, and the burnt part only fourteen buſhels per acre.

Beſides this was not the only difference, for in leſs than a month after harveſt, the ſurface of that part of the field to which the aſhes had been applied, was entirely covered with young furze, while the other part remained perfectly clean and free from it.

I have alſo tried burn-baiting as a preparation for potatoes, and have been equally diſappointed and unſucceſsful.

Wiſhing the Society all the ſucceſs which their generous attention and activity merit;

I remain, Sir,

Your humble ſervant,

JOHN BILLINGSLEY.

Shepton-Mallet, Dec. 7, 1779.

ARTICLE LVI.

Reſult of Experiments to aſcertain the Advantage of cultivating RHUBARB.

AFTER the receipt of the ſeveral letters relating to the expediency and advantage of cultivating the *Rheum Palmatum*, or True Rhubarb, on a large ſcale in this country, the Society requeſted ſeveral medical gentlemen to make experiments on the ſpecimens ſent by their correſpondents. Theſe experiments were made with care and accuracy, and the reſult is contained in the following *Report*, which was ſent to the Society by Dr. FALCONER, of Bath. In conſequence of this Report, premiums, to the amount of one hundred pounds, were offered for cultivating and properly curing this plant in the four counties.

Dr. Falconer's Report.

RHUBARB is the *Rhaved* of the Arabians; the *Rha Barbarum* of Alexander Trallianus; the *Rheum* of Paulus Agineta; the *Rheum Barbarum* of Myrepſus; the *Rha Barbarum Officinale* of Caſpar Bauhin, and of the London Diſpenſatory. What it is of Linnæus, I cannot ſay. Dr. Lewis ſays, it is the *Rheum foliis ſubvilloſis petiolis æqualibus*,

bus, Linnei, Spect. plant.; and ſo ſays Mr. Vogel. Now, this deſcription is affixed by Linnæus to the *Undulatum*, which is not at preſent underſtood to be the true Rhubarb. On the other hand, Dr. Rutty aſſerts the *Palmatum* of Linnæus to be the true Rhubarb; and I believe that opinion is now generally thought to be right by the beſt Botaniſts and ableſt phyſicians. It is called *Rha*, by the Tartars; and from thence is derived *Rha Barbarum*, as growing among barbarous nations. It is named Rha, from the river Volga, which is ſo called by the Tartars, near which it is cultivated. It was firſt mentioned by Alexander Trallianus, in the year 560, but appears to have been in uſe among the Arabs prior to that period.

In earlier times, the *Rhapontic* was thought to be the true Rhubarb, and ſpoken of as ſuch by Dioſcorides and Celſus; being the *Rheum* or *Rha* of the former, and the *Radix Pontica* of the latter.

The marks of its goodneſs are, to be perfectly dry, and friable, yet with a good degree of hardneſs or ſolidity, and perfectly uniform in its ſubſtance. It generally comes to us in roundiſh pieces, with a hole through the middle of each, and is externally of a yellow colour, but that in foreign Rhubarb is often artificial. When cut, it is of a fine reddiſh yellow, variegated with lively reddiſh ſtreaks, intermixed with white. When powdered, it appears of a bright yellow, and, on being chewed, imparts to the ſpittle a deep ſaffron tinge. Its taſte is rather acrid, bitteriſh, and ſomewhat aſtringent; its ſmell is lightly aromatic; when chewed, it ſeems gritty, as if ſand were mixed with it.

The ſpecimen of Rhubarb preſented to the Society, and ſubmitted to my examination, anſwered to all theſe qualities. I compared it with ſpecimens of the beſt Turkey and Eaſt-Indian kinds. It was rather, though very little, leſs aromatic and reſinous than the former; and had ſomewhat fewer of the reddiſh ſtreaks through its ſubſtance, but was much clearer, and more diſtinctly marked, than the Eaſt-Indian.

In ſpecific gravity, it was near the Turkey, and not ſo hard or heavy as the Eaſt-Indian. In taſte, I could not diſtinguiſh it from the Turkey, except that I thought it ſomewhat, though very little fainter. The tincture made with brandy was of a bright, clear, yellow colour, not diſtinguiſhable from the Turkey, but ſuperior to the Eaſt-Indian.

The infuſion with water was alſo nearly, if not altogether, equal in colour, taſte, and ſmell, to the Turkey, and ſuperior to the Eaſt Indian. The ſmell of the powder was not diſtinguiſhable from the Turkey, and ſuperior alſo to the Eaſt-Indian.

I tried its purgative virtue in ſeveral inſtances; and another gentleman, to whom I gave ſome of it, tried it alſo in ſeveral other caſes. We agreed perfectly in our account, that its operation was, in every reſpect, ſuch as might be expected from the beſt foreign Rhubarb.

Finally; I think the ſpecimens ſhewn to me are extremely good in their kind, very little (if at all) inferior to the beſt brought from Ruſſia or Turkey, and fully ſufficient to ſupply the place of foreign Rhubarb.

W. F.

ARTICLE LVII.

Obſervations on the beſt Method of deſtroying Vermin, and preventing the deſtruction of young Turnips by the Fly.

I Beg leave to offer to the Society an account of a few trials I have made to prevent the deſtruction of ſeed and ſpringing grain, pulſe, &c.

by vermin of different kinds. I am not excited to write by motives of intereſt, or with a view to obtain honour; but wiſh to caſt in my mite for the promotion of uſeful knowledge.

I have for ſome years paſt left off trade, and taken a ſmall eſtate into my own hands, principally for my own amuſement and inſtruction in the operations of nature.

As I am fond of a garden, I have frequently attempted to raiſe early peaſe; but was often diſappointed by their being deſtroyed by mice. To remedy this, I conſidered that *ſweets* were their delight; and ordered the gardener to ſteep both my peaſe and beans in common water three hours; and after ſowing them in drills as uſual, to ſhake ſome coal chimney ſoot over them pretty thick before he covered them in; by which means I have not loſt any for ſeveral years; and the ſoot proves a good manure.

Soon after I took the farm, I found I had many enemies to encounter with; ſuch as the *black flea*,* *grub-worms*, *birds*, *rats*, &c. I generally ſow cabbage-ſeed enough to plant out two acres of land, for the ſupport of my ewes and lambs* in the ſpring, when graſs is ſcarce. But when I firſt took my farm, after ſeveral ſowings, I could ſcarcely raiſe enough for my purpoſe, the black flea eating them off while young; but conſidering that this inſect loves to be in the ſunſhine, I ſowed my ſeed under the ſhade of apple-trees, and was not diſappointed. This laſt ſummer twelve-month I attacked them in the ſunſhine, by ſowing the ſeed in the garden, and ſcattering ſoot on the ground directly, by which means all my ſeedling plants were ſaved. This laſt ſummer, abſence from home prevented my repeating the experiment. It is, however, an eaſy trial for gentlemen to make; and I think it may be depended on as an effectual remedy.

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* By the ſubſequent part of this letter, it appears, that by the *black Flea*, our author means the *Fly* that preys on young turnips.

Chaffinches are alſo very eager in preying on ſeedlings ſoon after they are out of the ground, pulling them up by the roots, although they only eat the ſeed leaves. But whether they would attack them on ground that has been ſown with ſoot, I cannot from my own experience ſay—the experiment is, however, eaſy and worth making. I think the beſt mode of trying it would be, while the dew is on the ground, for ſome perſon to powder over the ſeedling plants lightly with ſoot, before the third leaf appears. It is probable that the bitter flavour of ſoot is very diſguſtful to birds as well as inſects.

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* This Gentleman ſeems not aware how good and profitable cabbages are early in ſpring for oxen.

The firſt year I ſucceeded very well in planting out my cabbages; the weight of the crop being from ten to twenty pounds, which was equal to my expectation, conſidering the ground was light and ſandy.

The next year, I ſowed my cabbage-ſeed as uſual. When the plants were fit for tranſplanting from the ſeed-bed, I attended, and found many of them had knobs or warts on the roots, ſome the ſize of a pea, and others larger. On cutting ſome of theſe knobs off, I found a very ſmall worm incloſed. I ordered them to be planted out; and looking over the ground after they had formed pretty good heads, I obſerved many of them looked ſickly, having a blueiſh caſt on the leaves. I pulled ſeveral of them out of the ground, and found the roots ſwelled as big as a child's fiſt, the grub-worms being then come to perfection.

To prevent this, tranſplant only ſuch as are quite clean from warts. At the time of planting, the ground is frequently dry, and ſometimes even ſcorched with heat. In that caſe, let the planter, after making a hole with his dibble, pour in ſome water, and ſtir it in till he has made the earth a ſoft puddle.* A boy ſhould dip the roots of the plants firſt into water, and then into dry ſoot immediately before they are planted. According to my idea, this will prevent the grub from ever touching them.

I ſhall now follow the grub-worms and birds into corn-fields. The two firſt years of my ſowing wheat, I could not get, from nine to ten acres produce, more than ten buſhels per acre. On a nice examination, I found the grub-worms attacked my wheat *under* ground, and birds of various ſorts *above* it. It was neceſſary to ſeek for a remedy. I ordered two buſhels of ſeed wheat to be put on the barn floor as uſual, with a proper quantity of lime and ſea-water, (ſome uſe brine.) I then ordered a quarter of a peck of ſoot to be added, and worked well in with the corn, that all might be rendered bitter by it. If a larger quantity of ſoot be uſed, the better, as it proves good manure. My ſucceſs the firſt year was, that I had twenty buſhels on an average per acre. This laſt ſummer the produce was ſtill larger. After ſowing, my ſervant told me, that if I did not ſend a perſon to frighten the birds, the wheat would be half carried away; however, I let it alone, to ſee the effect of the ſoot. Pheaſants and partridges had ſcraped the ground very much. I particularly marked the ſpots, and at harveſt, found the corn thicker there than in other places. This convinces me, that the birds could not find any corn ſuited to their palates, the ſoot having rendered it very bitter; and I had a good crop for ſo light a ſoil.

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* This is certainly a good method, and may be practiſed in a *Garden*—but when a Farmer wants to plant ſeveral acres, the proceſs would be too tedious, if not quite impracticable.

Secondly; The crops of young turnips are frequently deſtroyed by the black flea [fly] notwithſtanding many things have been tried to preſerve them; all of which I am informed have failed. On this ſubject I will offer a few thoughts:—The ſenſe of ſmelling in the black flea, [fly] and in all other inſects, is exquiſitely acute; without it they know not one plant from another, as their ſphere of viſion is probably confined to a very few inches. It is by this ſenſe that they are guided to their proper food. The only thing neceſſary then is, to overpower the ſweet ſmell they are attracted with, by one that is ſtrong, fœtid, and diſagreeable.

What I would therefore propoſe is, that an acre of turnips be ſown in the uſual way, and after the ground is finiſhed, for the ſeedſman to throw on a peck or more of dry ſoot, as regularly as he ſows the ſeed. If I am not very much miſtaken, this will baniſh or deſtroy all the black fleas, and by that means ſave the crop.

Thirdly; When I firſt came to the houſe I now inhabit, we were much troubled in the night by the noiſe of rats. Mentioning this circumſtance to the farmer, who was about to leave the premiſes, he told me they had done great damage in the barns and corn-rick. In the ſide of a bank which ran along the path-way to my barn, I obſerved a number of holes, in which the rats harboured and bred in warm weather. The next day making ſome matches with ſlips of brown paper dipt in brimſtone, I put them into the holes—the mouths whereof I ſtopt, to drive the ſmoke inwards. After the matches were burnt out, my man opened the ground, where we found ſeveral neſts; but both old and young were fled. The rats left my houſe, barn, and ſtables, directly; and for five years paſt have never returned. The diſagreeable ſmell of the burnt brimſtone, doubtleſs, occaſioned their leaving the premiſes. I would therefore propoſe, that when a barn is cleared out juſt before harveſt, a pan of charcoal be lighted up in it, and ſome pieces of brimſtone thrown on the fire, to fumigate the whole barn. If the doors and windows are ſhut cloſe, this will be done moſt effectually.

Fourthly; Having a field over-run with moles, I had the freſh mole-hills ſhovelled off, and the holes opened; I burnt a match in each, keeping in the ſmoke. The conſequence was, that all the moles left the field directly, and returned no more. But ſhould they return in future; it is only repeating the experiment, and I doubt not but it will have the ſame effect.

I ſhall now conclude for the preſent; but may probably employ ſome future hours in ſending ſuch other obſervations as may occur in the courſe of my experience; and which may be uſeful in promoting the laudable purpoſes intended by your inſtitution, to which I wiſh all poſſible ſucceſs.

And am, with great reſpect, your's, &c.

Arne, near Wareham, Dorſetſhire,
Jan. 20, 1780.

J. JACOB.

ARTICLE LVIII.

On the Culture of Carrots, and the Rot in Sheep; by a Gentleman near Norwich.

[In a Letter to the Secretary of the Bath Society.]

SIR,

I Thank you greatly for the two letters you tranſmitted to me in your laſt; the one from Mr. Billingſley, on the culture, expences, and produce of a crop of Carrots; the other containing Mr. Pryce's thoughts on the Rot in Sheep.

On the firſt ſubject, as ſomewhat informed by having ſometimes grown four or five acres, never leſs than one or two in every year, for a conſiderable time, I dare venture to aſſure you, that Mr. B.'s ſtate of the expences incurred are, in the articles of ploughing, harrowing, carting home, and ſecuring, rather beyond the price I have ever paid for the ſame; and that he is not in any other of his articles beneath the fulleſt price here, nor is his produce greater than common, or what may be expected from ſuch management; ſo that it is both as juſt and accurate an account as I have met with. The only objection to it which ſtrikes me is, the heavy expence he was at of thirteen ſhillings per acre for ſowing and covering the ſeed in drills, which practice, from two trials only which I have made of it, appears to me not ſo eligible as ſowing the ſeed broad-caſt. The two drilled crops were with me the worſt I ever grew. The ſeed of carrots, although ever ſo well rubbed with ſand or any other ſubſtance, will ſtill adhere together to that degree, as to render the delivery of it in drills not only tedious, but very uncertain; and wherever they fall in patches, the loſs of ground is conſiderable; beſides, the difference of nine-pence or a ſhilling per acre at moſt for random ſowing, and thirteen ſhillings per acre for drilling, is an object worth attending to.

The great expence attending the culture of carrots, being the chief, perhaps the ſole obſtacle to the general growth of them, every abridgement of that expence ſhould be ſtudied, as it bids fair to promote their common uſe. Perhaps the method in which I have for ſome few years paſt proceeded, where it can be adopted with convenience, will be found as profitable, and attended with leſs trouble than any other. The proportions of it may be varied to ſuit the wiſhes or wants of every cultivator.

In a field containing four acres, I firſt grew a crop of Turnips, which were clean hoed, and left very free from weeds; they were afterwards fed upon the land, which was immediately (in the beginning of March) manured with ten loads of dung, firſt ploughed in with a common plough, and afterwards trench-ploughed about fourteen or fifteen inches deep; two acres of which were harrowed very fine, and the ſeed ſown about the middle of March, (though in general I prefer ſowing towards the latter end of that month, as I have always found the plants come up nearly as ſoon as the earlier ſown, and attended with fewer weeds.) The carrots came up regularly and well, were ready to hoe in the beginning of May, and tolerably free from weeds; ſo free indeed that they were hoed out with large hoes, and proved an excellent crop. The other two acres (part of the four which had been turnips) were prepared by ploughing and manuring as for the carrots, and ſet with potatoes, which came up very clean, and proved an abundant crop. In the ſucceeding year I grew one acre of carrots (with the former preparations) on the land where the potatoes grew, and one acre of potatoes where the carrots had grown; the other two acres were turnips. Ever ſince, for eight or ten years, this field has grown turnips, carrots, and potatoes, in the rotation above-mentioned: the carrots and potatoes coming upon the ſame ground only once in three years, the turnips every other year, whereby the land is become ſo clear of weeds and ſo rich, that my crops are annually better, and the expence of hoeing leſſened at leaſt one-half. The ſoil, on which this huſbandry has been practiſed, is a good loam, inclined to ſandy.

I have kept ſo few ſheep, and obſerved them ſo little, that I cannot preſume to offer my thoughts to you upon that ſubject.

Mr. Arthur Young's obſervation, that "the "accounts are ſo amazingly contradictory, that "nothing can be gathered from them," is as true as I am inclined to think his concluſion is, "that "moiſture is the cauſe;" and in this opinion I am confirmed as far as a ſingle inſtance can confirm me. It was in the caſe of a paddock adjoining to my park, which had for ſeveral years cauſed the rot in moſt of the ſheep which were put into it. In the year 1769, I cauſed it to be under-drained with covered drains, which have worked well ever ſince, effectually curing its wetneſs; and, notwithſtanding I have ſince kept my ſheep in it, I have never killed one whoſe liver has been at all affected.

This, ſurely, ſeems to prove, as far as a ſingle inſtance can do it, that, by taking away the ſuperabundant water, I have entirely prevented the diſorder. Whether the ſame aroſe from plants peculiar to a wet ſoil—whether from the eggs of inſects lodged on ſuch plants—whether from the nature and quality of all or any plants growing in ſuch ſituations—or whether, as ſome have thought, from the mere act of lodging on ſuch land,—are queſtions of more curioſity than uſe. The mere knowledge of the means of preventing ſo dreadful an evil being ſufficient to anſwer every wiſh and purpoſe of the farmer.

Mr. Billingſley's opinion, confirmed by his experience, of the impropriety of burn-baiting, coincides entirely with the idea I had ever conceived of that practice. It can never be good, but where the ſoil is very deep, and full of large coarſe roots and other vegetable ſubſtances. The earth itſelf, when burnt, I have found to be a mere *caput mortuum*. I am,

Your obliged friend,

J. B.

ARTICLE LIX.

An Abridgement of ſeveral Letters publiſhed by the Agriculture Society *at Mancheſter, in conſequence of a Premium offered for diſcovering, by actual Experiment, the Cauſe of the* Curled Diſeaſe *in Potatoes.*

LETTER I.

THE writer of this letter is of opinion, that this diſeaſe is cauſed by an inſect produced by froſt or bad keeping before ſetting; and that the neweſt kinds, ſuch as have been raiſed within theſe nine or ten years, are moſt apt to curl, becauſe they will not ſtand to be kept in winter and ſpring before ſetting, as the old kinds will; for in one experiment he took an equal quantity of fine potatoes (what are called Manley's) out of the heap; one part he kept moiſt and cool, which made them full of virtue, and firm; that when they came to be ſet, there was moiſture to diſſolve the ſet, and feed the branch, and not one curled amongſt them.

The other part he kept dry and free from wet, till wrinkled and ſoft, and the moiſture almoſt expended, ſo that when ſet, inſtead of putrifying and decaying, the ſet itſelf received nouriſhment from the ground, and became ſolid and harder than ever, and all in a manner curled.

In autumn 1776, he got up a bed of potatoes to lay by in winter, leaving plenty in the ground as regular as poſſible; and, before the ſeverity of winter came on, covered part of the bed with ſtraw and peaſe-haulm, and left the other part of the bed uncovered; that part of the bed which was covered was quite free from curled ones, but the uncovered part produced a great many curled, owing, as the writer ſays, to froſt and ſeverity of the weather.

LETTER II.

THE writer of this letter had about a quarter of an acre of potatoes, well manured with cow and horſe-dung, and took the greateſt care in picking the fine ſmooth-ſkinned potatoes for ſets: yet nine out of ten parts were curled. He attributes the cauſe of this diſeaſe to a white grub or inſect, which he found near the root, about half an inch long, with eight or ten legs, its head brown and hard; as upon examining a number of the curled roots, he found them all bitten, chiefly from the ſurface to the root, which of courſe ſtopped the progreſs of the ſap, and threw the leaf into a curl. The uncurled roots were not bitten. He tried a few experiments as follow:—Firſt, he put ſoot to the inſects in the rows for two days; and after that, he put lime to them for the ſame time, but they ſtill kept lively: next he put a little ſalt, which deſtroyed them in a few hours. From which he infers, that if coarſe ſalt were put into the ground at the time the land is preparing for potatoes, it would effectually cure this diſtemper.

LETTER III.

THIS writer attributes the cauſe of the diſeaſe to the method of earthing the ſtems while in cultivation; and that the branch, ſtriking roots into the new earthed-up ſoil, produces potatoes of ſuch a nature as the year following to cauſe the diſeaſe complained of.

To prevent the diſeaſe, he recommends the ſets to be taken from thoſe potatoes that have not bred any from the branch covered; or otherwiſe, to dig the part the ſets are to be raiſed from.

LETTER IV.

THIS writer thinks that the diſorder proceeds from potatoes being ſet in old tilled or worn-out ground; for, though thoſe potatoes may look tolerably well, yet their ſets will moſt, if not all, produce curled potatoes; hence he is convinced, that no ſets ought to be uſed from old tilled or couch-graſs land; and that, in order to have good ſets, they ſhould be procured from land that was purpoſely fallowed for them; from freſh ley land, where they are not curled; or from ley land that was burnt laſt ſpring: Plant them on virgin mould, and your potatoes will have no curled ones amongſt them: keep them for winter from any other kind.

To avoid the uncertainty of getting good ſets, he recommends crabs to be gathered from potatoes growing this year on freſh land, free from curl, and the next ſpring to ſow them on freſh ley land, and continue to plant their ſets on freſh ley land, yearly, which he is convinced will prevent the curl.

There are different ſorts of curled potatoes, ſome badly curled, others not ſo bad: thoſe that are badly curled will not be recovered by planting them on fine freſh ley land; and thoſe that are but little curled may be recovered by planting them on the afore-mentioned land.

Some potatoes will have one good ſtem, and one curled ſtem, owing to the ſet having two eyes: one end of which rots, and will have a good ſtem; the other end is hard, and will have a curled ſtem.

Several perſons have ſown ſeed in old-tilled gardens, in hopes to have been free from the curl; but wherever they planted them next year, they have been curled.

All the good potatoes he ſaw this year, either on freſh ley land, or on old tilled land, were raiſed from ſets that grew upon freſh ley land laſt year; and where he has ſeen curled potatoes, he found, upon enquiry, the potatoe-ſets grew upon old tilled and worn-out land laſt year. He gives as a general reaſon for the diſorder, that the land is oftener cropt than it had uſed to be, much more corn being now raiſed than formerly.

LETTER V.

IN 1772, this writer planted ſome potatoes by accident full *nine* inches deep: when taken up, many of the plants were rotted, and a few curled. He kept the whole produce for ſeed, and planted two acres with it in 1773, not quite ſix inches deep: the crop was amazingly great; and he did not obſerve any curled plants among them. In 1774 many of theſe were planted in different ſoils, yet they were ſo infected with the curled diſeaſe, that not one in twenty eſcaped. In 1775, the complaint of this diſeaſe became general. In 1776, it occurred to him that the good crop of 1775 was owing to the *accidental deep* ſetting of 1772; and that the reaſon why the *ſame ſeed* became curled in 1774, was their being ſet ſo near the ſurface in 1773, and attributes the diſeaſe to the practice of *ebb-ſetting*. In 1777, he took ſome potatoes from a crop that was curled the year before, and after cutting the ſetts, left them in a dry room for a month. Half were planted in ground dug fourteen days before; the other half, having been ſteeped in a brine made of whitſter's aſhes for two hours, were alſo planted in the ſame land, at the ſame time. The ſteeped ones came up ten days before the others, and hardly any miſſed, or were curled. The unſteeped ones generally failed, and thoſe few that came up were moſtly curled.

He therefore adviſes as a remedy,

1. That the potatoes intended for *next* year's ſetts, be planted nine inches deep.

2. That they remain in the ground as long as the ſeaſon will permit.

3. That theſe ſetts be well defended from froſt till the beginning of March.

4. That the ſetts be cut a fortnight before planting.

5. That they be ſteeped as above, two hours in brine or lye.

6. That the dung be put *over* the ſets. And

7. That freſh ſets be got every year from ſandy ſoils near the coaſt, or on the ſhore.

P. S. At planting, the hard dry ſetts ſhould be caſt aſide, for they will probably be curled. Curled potatoes always proceed from ſetts which do not rot or putrefy in the ground.

LETTER VI.

THIS writer had five drills of the old red potatoes, and four of the winter whites, growing at the ſame time in the ſame field. The drills were prepared exactly alike. Among the red not one was curled; the winter whites were nearly all curled. He ſays he has found by experience, that the red never curl.

LETTER VII.

TWO of the writer's neighbour's had their ſets out of one heap of potatoes. They both ſet with the plough, the one early, and the other late in the ſeaſon. Moſt of thoſe early ſet proved curled; and moſt of thoſe ſet late, ſmooth; the latter on clay land.

A few roods of land were alſo planted with ſmall potatoes, which had lain ſpread on a chamber floor all the winter and ſpring, till the middle of May. They were ſoft and withered; they proved ſmooth and a good crop. Middle-ſized potatoes, withered and ſoft, which had been kept in a large dry cellar, and the ſprouts of which had been broken off three times, produced alſo a ſmooth good crop.

Hence he was led to think a ſuperfluity of ſap, occaſioned by the ſeed being unripe, might cauſe the diſeaſe. To be ſatisfied in this, he aſked the farmer whether he had ſet any of the ſame potatoes this year, and what was the nature of his land.

He told him " he had; that they had been ſet on " his farm fourteen years, without ever curling; " that his ſoil was a poor whitiſh ſand, of little " depth; that he let thoſe he deſigned for keeping " grow till they were fully ripe."

Hence he concludes, the only ſure way to prevent the curl is, to let potatoes, intended for ſeed, ſtand till they are fully ripe, and to keep them dry all winter.

LETTER VIII.

THIS writer ſet a quantity of the red potatoes, without having a curled one amongſt them; his method is, when the ſetts are cut, to pick out ſuch as are reddeſt in the inſide. On digging them up at Michaelmas, he mixes none of the curled ſeed among the others. The curled are eaſily diſtinguiſhed, by their ſtalks withering two months before the reſt of the crop.

The cauſe of the curled diſeaſe he attributes to potatoes being of late years produced from *ſeed* inſtead of *roots*, as formerly. Such will not ſtand good more than two or three years, uſe what method you pleaſe. Laſt ſpring, he ſet the old red and white ruſſets, and had not a curled potatoe amongſt them.

On the lime-ſtone land about Denbigh, in North Wales, they have no curled potatoes. If this be owing to the nature of that land, perhaps lime might prevent the diſeaſe.

LETTER IX.

THIS writer ſays, that all ſorts of grain wear out and turn wild, if ſown too long on the ſame land; the ſame will hold good in all ſorts of pulſe, peaſe, beans, and (as he conceives) potatoes. It generally happens, that thoſe who have moſt curled potatoes plant very ſmall ſetts.

Eleven years ago he bought a parcel of freſh ſetts, of the golden-dun kind, and has uſed them without change to the preſent year, without any being curled. This he principally attributes to his having always planted good large ſetts.

About four years ſince, he thought of changing his ſetts, as his potatoes were too ſmooth, too round, and much diminiſhed in ſize. But the curl at that time beginning to be very alarming, he continued his ſetts till part of his crop miſſing laſt year, he was obliged to buy new ſetts this ſpring, which, being ſmall, were curled like other people's.

He allows, that the curl has frequently happened to perſons who have uſed large potatoes for ſetts; for, as all roots are not equally affected, ſome curled ones may be mixed with the reſt.

To prevent the evil, cut your ſetts from clear and middle-ſized potatoes, gathered from places as clear of the curl as poſſible; preſerve them as uſual till ſpring. If any are harder, or graſh more in cutting than uſual, caſt them aſide. He would alſo recommend the raiſing a freſh ſort from the crab produced on the ſorts leaſt affected, which in Lancaſhire are the *long-duns*.

N. B. Here follow three certificates from perſons who have raiſed their crops from large ſetts of the long-duns, for many years, without being affected with the diſeaſe.

LETTER X.

SET Potatoes with the ſprits broke off, and they will (ſays the writer of this letter) be curled ones;

if ſet with the ſprits on, they will not be curled. Again, take a potatoe which is ſprit, and cut a ſett off with two ſights; break one ſprit off, and let the other ſtay on, and ſet it; the former will be curled, and the latter will not.

When you have holed your potatoes, take them out before they are ſprit, and lay them dry until you have ſet or ſown them, and you will have no curled potatoes.

LETTER XI.

THIS writer was at the expence of procuring ſetts at fifty miles diſtance, and where this diſeaſe was not known; the firſt year's trial was ſucceſsful; the year following he procured ſetts from the ſame place; but one-fifth of his crop was infected. By way of experiment, he planted ſetts from roots which had been infected the year before, and ſome of theſe produced healthy plants, free from all infection.

As every effect muſt have a cauſe, he ſuppoſed it might be ſome inſect, which, living on the leaves, gave them that curled and ſickly appearance, as is the caſe in the leaves of many ſhrubs and trees. But whether the inſect is lodged in the *old ſets*, and to be deſtroyed at the time of planting, or, proceeding from ſome external cauſe, can only be deſtroyed afterwards, he is not yet certain, although he has made the following experiments.

On a piece of ground that had not been dug for twenty years, he planted four rows of ſetts, which he knew to be perfectly clear: the drills were two feet diſtant; the ſetts one foot diſtant in each drill. He then planted on the ſame ground four rows with ſetts from curled potatoes, at equal diſtances; in each row were about twenty ſetts.

Lot 1ſt, the curled ſtate.

No. 1. without manure,
2. in ſalt,
No. 3. in ſoot,
4. in quick-lime.

Lot 2d, the clear ſets.

No. 1. without manure,
2. in ſalt.
No. 3. in ſoot,
4. in quick-lime.

Thoſe planted in ſalt and ſoot in both lots, were deſtroyed. In Lot 1, No. 1, and 4, all curled. Lot 2, No. 1, and 4, quite clear.

This experiment was made on a ſuppoſition, that the inſect lodged in the ſett, and muſt be deſtroyed on planting. But of that he is not fully ſatisfied. He repeated ſalt, ſoot, and quick-lime, on the branches of ſeveral curled potatoes. Salt deſtroyed all he touched with it. Lime and ſoot had, he thought, a partial effect on the plants. After ſome time, they appeared almoſt as healthy as the reſt. Thus, although he had done little towards the cure, he flatters himſelf he has pointed out the cauſe, the inſects on the curled plants being not only very numerous, but viſible to the naked eye.

LETTER XII.

THIS writer aſcribes the cauſe of the curled diſeaſe in potatoes to the froſt and bad keeping in winter and ſpring before ſetting. They are liable to be damaged by froſt after they are ſet, but this may be prevented by covering. If it be aſked why froſt did not injure them formerly, he anſwers, it is only the NEW kinds which are apt to curl. To this may be added, that leſs care is now taken of the ſeed than formerly. To prevent the latter, let them remain in the ground covered with haulm or litter, till the time they are wanted for ſetting; and, in caſe no froſt touches them afterwards, they will be free from the diſeaſe.

LETTER XIII.

THIS writer ſays, the red potatoe was as generally planted as the winter white and the Lincolnſhire kidney are now. The firſt, being a later potatoe, did not ſprout ſo early as the others. The *white* ſprout very early, and therefore ſhould firſt be moved out of the place where they have been preſerved in the winter. Inſtead of that, they are often let remain till their roots and ſprouts are matted together. On ſeparating them, theſe ſprouts are generally rubbed off, and they are laid by till the ground is ready; during which interval they ſprout a ſecond time: but theſe ſecond ſprouts, being weak and languid, will ſhrink, ſicken, and die, and the fruit at the roots will be ſmall, hard, ill-ſhaped, and of a brown colour.

Now, if putting off the ſprouts once or more, before the ſetts are put in the ground, be the cauſe (as he verily believes it is) of the curled diſeaſe, an eaſy remedy is at hand. When the potatoes intended for ſetts are dug up, lay them in a weſt aſpect as dry as poſſible: in ſuch a ſituation they will not ſprout ſo ſoon. The beſt time for removing moſt ſorts is, the firſt fine day after the 24th of February. Cut them into ſetts as ſoon as poſſible, and let them remain covered with dry ſand till the ground is prepared, which ſhould be a winter-fallow. Lay the ſetts in without breaking off any of the ſprouts, for the ſecond will not be ſo vigorous. This accounts for *one* ſprout out of three from the ſame ſett being curled. The two ſtems not curled roſe from two later eyes, and were firſt ſprouts. The ſprout curled was a ſecond, the firſt having been rubbed off.

LETTER XIV.

THIS writer ſays, that laſt ſpring one of his neighbours cut and ſet, in the uſual way of drilling, ſome loads of the largeſt potatoes he could procure; and more than half of them proved curled. Being a few ſetts ſhort of the quantity wanted, he planted ſome very ſmall potatoes, which he had laid by for the pigs. Theſe being fully ripe and ſolid, there was not a curled plant among them. He apprehends, the others being curled was owing to their not being fully ripe. A crop of potatoes, ſet this year in rows, on ground that had borne a crop of them laſt year, were moſtly curled; but many plants came up from ſeed left in the ground laſt ſeaſon, and there was not a curled one among them.

LETTER XV.

ALTHOUGH, the writer of this letter obſerves, it is generally believed, that taking up potatoes, intended for the next year's ſet, too ſoon, is a *principal* cauſe of the curled diſeaſe, he has his doubts reſpecting it; having let ſome remain in the ground all winter, and vegetate the following ſpring, ſome of them were curled, and others not, in like manner as thoſe ſetts proved which he took up and planted as uſual. This, therefore, he infers, cannot be the *principal* cauſe. The old white rough, and the kidney potatoe, are as ſubject to this diſeaſe as the reſt. Red potatoes, of moſt kinds, are ſeldom affected with it.

LETTER XVI.

OF late years, this writer ſays, great improvements have been made in ſetting potatoes, and cutting the ſetts. The ground is dreſſed cleaner and dunged ſtronger. Many people, in drilling, wrap up the ſetts entirely in the dung; by which means, though their potatoes are larger, the diſeaſe ſeems to be increaſed. They alſo cut their ſetts out of the richeſt and largeſt potatoes, which is perhaps another cauſe of this evil. In cold countries, where they ſet their own ſeed, which has grown on poor land, with leſs dung, they have no curled plants. On the contrary, when they bought rich and large potatoes for ſeed, they have been curled in great quantities. He believes, the richneſs and largeneſs of the ſeed to be the cauſe of the evil; for he does not remember to have ſeen a curled ſtem which did not ſpring from a ſett of a large potatoe.

LETTER XVII.

THIS writer apprehends the curled diſeaſe in potatoes, to proceed from a defect in the *planta ſeminalis* or ſeed-plant; and from comparing curled ones with others, there appeared to be a want of, or inability in, the powers of expanding or unfolding the parts of the former; which, from this defect, forms ſhrivelled, ſtarved, curled ſtems. On examining ſome of the ſetts, at the time of getting the crop, he found them hard and undecayed; ſo hard indeed, that ſome of them would not be ſoft with long boiling. This led him to think that ſome manures might have the ſame effect on them as tanner's ooze has on leather, and ſo harden them that the embryo plant could not come forth with eaſe; but a cloſer examina-

tion

tion taught him otherwiſe, and that they grow equally in all manures.

Some have thought that the fermentation is occaſioned by too great quantities being heaped together; but the writer has ſeen an inſtance, wherein a ſingle potatoe, preſerved by itſelf, when ſet, produced ſtems of the curled kind. He thinks the moſt conſiſtent and rational opinion is, that the diſeaſe is occaſioned by the potatoes being taken from the ground before the ſtamen, or miniature-plant, is properly matured and ripened.

For let it be obſerved, that the potatoe, being a native of a warmer climate, has there more ſun, and a longer continuance in the ground, than in its preſent exotic ſtate; conſequently, it has not the ſame natural cauſes *here* to mature the ſeed-plant, as in its native ſtate. We ought, therefore, to give all the opportunities our climate will admit for nature to complete her work, and fit the *ſtamen* for the next ſtate of vegetation, eſpecially in thoſe intended for ſeed. But if the potatoe be taken up before the ſeed-plant be fully matured, or the air and ſap-veſſels have acquired a proper degree of firmneſs or hardneſs, it muſt, when thus robbed of further nutrition, ſhrivel up; and when the veſſels, in this immature ſtate, come to act again in the ſecond ſtate of vegetation, they may produce plants which are curled.

If it be aſked, why are they more common *now* than formerly? he anſwers, that before the preſent mode of ſetting them took place, people covered them, while in the ground, with ſtraw, to protect them from froſt.

If it be aſked, why one ſett produces both curled and ſmooth ſtems? he anſwers, we ſuppoſe every eye to contain a *planta ſeminalis*; that all the embrios, or ſeed-plants, contained in one potatoe, are nouriſhed by one root; that as in ears of corn, ſome of theſe ſeed-plants may be nouriſhed before others.

One of his neighbours, laſt year, ſet two rows of potatoes, which proving all curled, he did not take them up; and this year there is not a curled one among them. Such potatoes, therefore, as are deſigned for ſeed, ſhould be preſerved as long in the ground as poſſible.

LETTER XVIII.

THIS writer adviſes ſuch ſetts to be planted as grow in moſs-land; and, he ſays, there will not be a ſingle curled one the firſt year. This is affirmed by the inhabitants of two townſhips, where they grow amazing quantities.

A medical gentleman ſowed laſt year two buſhels of ſetts from one of the above places, and had not one curled; but on ſowing them again this year he had a few.

N. B. Although the foregoing letters do not point out with certainty the real or general cauſe of the curled diſeaſe in potatoes, or diſcover any ſpecific remedy which reaches all caſes, yet as they contain many intereſting obſervations both on the diſeaſe itſelf, and the beſt methods hitherto adopted for preventing it, we think they are not improperly introduced in this work. And, notwithſtanding there ſeems to be a diverſity of opinions in the writers, occaſioned by the different appearances of their crops, and the ſeemingly contrary effects of the means uſed to prevent or cure the diſeaſe, we conceive, that the following *general propoſitions* may be fairly drawn from the whole:

Firſt; That ſome kinds of potatoes are *(cæteris paribus)* much more liable to be affected by the diſeaſe than the reſt; and that the *old red*, the *golden-dun*, and the *long-dun*, are the moſt free from it.

Secondly; That the diſeaſe is occaſioned by one or more of the following cauſes, either ſingly or combined; 1ſt, by froſt, either before or after the ſetts are planted; 2d, from planting ſetts cut out of large unripe potatoes; 3d, from planting too near the ſurface, and in old worn-out ground; 4th, from the firſt ſhoots of the ſetts being broken off before planting, by which means there is an incapacity in the *planta ſeminalis* to ſend forth others ſufficiently vigorous to expand ſo fully as they ought.

Thirdly; That the moſt ſucceſsful methods of preventing the diſeaſe are, cutting the ſetts from ſmooth middle-ſized potatoes, that were fully ripe, and had been kept dry after they were taken out of the ground; and without rubbing off their firſt ſhoots, planting them pretty deep in freſh earth, with a mixture of quick lime, or on lime-ſtone land.

ARTICLE LX.

Deſcription of, and Obſervations upon, the Cock-Chaffer, *both in its Grub and Beetle State.*

[By the Secretary of the Society.]

AS there are few inſects more prejudicial to the farmer than that generally known by the name of the *Cock-Chaffer*, I beg leave to make a few obſervations thereon.

In different parts of this kingdom theſe inſects are called by different names, ſuch as, the *Chaffer*, the *Cock-Chaffer*, the *Jeffry-Cock*, the *May-bug*, and (in Norfolk) the *Dor*.

In what claſs Linnæus ranks them, I do not remember; but they ſeem to be the *Scarabæus arboreus vulgaris major* of Ray.

When full grown in their grub-ſtate, they are near an inch and a half long, and as big as a child's little finger. Their heads are red, their bodies ſoft, white, and ſhining, with a few hairs on the back. They have three hairy legs on each ſide, all placed near the head, in which are two forceps or jaws, like the hornet; with theſe they cut aſunder the roots of graſs, corn, &c. and frequently deſtroy whole fields in a ſhort time. In this *eruca* or grub ſtate, they continue three and ſometimes four years.

In their beetle-ſtate they have two pair of wings; the one filmy, and the other ſcaly. The *interior* pair are folded up in a curious manner, and remain hid, unleſs when expanded for flight. The *elytra*, or caſe-wings, are of a reddiſh brown colour, and ſprinkled over with a fine white powder, like the auricula. The legs and tail (which is pointed) are whitiſh. The body is brown, except at each joint on the ſides of the belly, which is indented with white. The circles round the eyes are yellowiſh; the antena ſhort, and terminated by fine lamellated ſpreading tufts, which the creature expands more or leſs as it is briſk and lively or otherwiſe.

The firſt account I find of theſe deſtructive inſects, is given by *Mouffett*, who tells us, that in the year 1574, ſuch a multitude of them fell into the Severn, that they clogged, and even ſtopped, the wheels of the water-mills.

There is alſo an account in the Tranſactions of the Dublin Society, that the country people ſuffered ſo much in one county, by the devaſtation theſe inſects made, that they ſet fire to a wood ſeveral miles in length, to prevent their further progreſs.

In the day-time they ſeldom fly about, but conceal themſelves beneath the leaves of oak, ſycamore, maple, hazel, lime, and ſome other trees, which they ſoon eat to a ſkeleton; but about ſun-ſet they are all on the wing, and fly about the trees and hedges as thick as a ſwarm of bees.

While in their grub-ſtate, they entirely deſtroy all the graſs, corn, or turnips, where they harbour.

I have ſeen fine meadows, which in May and June have been all withered, and as brown as thatch.

Theſe grubs generally lie near two inches below the ſurface, and eat the roots of the graſs ſo regularly, that I have rolled up many yards of the withered turf as eaſy as though it had been cut for a garden.

When they attack turnips, they eat only the middle of the ſmall root; but by that means, kill all they bite without remedy.

Neither the ſevereſt froſts in our climate, nor even keeping them in water, will kill them. I have kept ſome in water near a week; they appeared motionleſs; but on expoſing them to the ſun and air a few hours, they recovered, and were as lively as ever. Hence, it is evident, they can live without air. On examining them with a microſcope, I could never diſcover any organs for reſpiration, or perceive any pulſation.

Hogs will root up the land for them, and at firſt eat them greedily; but ſeldom meddle with them a ſecond time. To rooks and crows they ſeem to be a high regale. When numerous, they are not deſtroyed without great difficulty; the beſt method is, to plough up the land in thin furrows, and employ children to pick them up in baſkets; and then ſtrew ſalt and quick-lime, and harrow in.

About thirty years ſince, I remember many farmers' crops in Norfolk were almoſt ruined by them in their grub-ſtate; and in the next ſeaſon when they took wing, the trees and hedge-rows in many pariſhes were ſtript bare of their leaves as in winter. At firſt the people uſed to bruſh them down with poles, and then ſweep them up and burn them. One farmer made oath, that he gathered eighty buſhels; but their number ſeemed not much leſſened, except juſt in his own fields.

Their mode of *coupling* is ſingular; and the time of their continuance in that act, ſometimes two or three days. I have ſeen one of them fly in that ſtate, with the other hanging pendant from its tail; and am in ſome doubt whether (like ſnails) they are not *hermaphrodites*, as there ſeems to be mutual inſertion.

They depoſit their eggs in the earth. The firſt year the grubs are very ſmall, and do little miſchief; the ſecond year they are increaſed to the ſize of a gooſe-quill, and are very injurious to the herbage; the third year they attain full ſize, and fly.

I am, &c.

E. RACK.

Bath, March 26, 1780.

APPENDIX.

A
PROPOSAL
FOR THE
FURTHER IMPROVEMENT
OF
AGRICULTURE.

BY

THE REV^{d}. WILLIAM LAMPORT.

SECOND EDITION.

Multum adhuc reſtat operis, multumque reſtabit; nec ulli nato
poſt mille ſecula precluditur occaſio aliquid adjiciendi.

PLIN. HIST. NAT.

M DCC LXXXIII.

TO THE

SOCIETY OF ARTS, MANUFACTURES, AND

COMMERCE, IN LONDON;

THE

AGRICULTURE SOCIETY AT BATH;

AND

THE OTHER AGRICULTURE SOCIETIES

IN

GREAT-BRITAIN AND IRELAND;

THE FOLLOWING PROPOSAL IS ADDRESSED,

WITH

ALL DUE DEFERENCE AND RESPECT,

BY THEIR

MOST OBEDIENT SERVANT,

THE AUTHOR.

PREFACE.

THE only diſagreeable circumſtance which the Author experienced in drawing up the following Propoſal, was, the neceſſity he found himſelf under of enlarging on the prejudices and untractableneſs of the illiterate Farmers and their ſervants.

Cenſure can be no pleaſing taſk, except to thoſe who deſerve the ſevereſt cenſure themſelves,—the proud, the envious, and the malicious.

But the Author's intention is, to raiſe the humble ſpirit of Agriculture, and to convince thoſe who are practically employed in it, that the more it is made an object of reaſon, the higher it will riſe in the ſcale of perfection.

He aſſerts nothing upon the report of others: his own reaſon, aided by ſome practice, has enabled him to exhibit the following Propoſal for the improvement of an Art, on which the wealth, ſtrength, and proſperity, of this nation principally depend.

A PROPOSAL FOR THE FURTHER IMPROVEMENT OF AGRICULTURE.

A Noble ſpirit, for making improvements in Agriculture, hath lately gone through this nation, for which poſterity will thank the preſent age in terms of the higheſt approbation. The principles on which thoſe improvements have been conducted are as judicious as the ſubject is important; and it is highly probable, that many good effects will take place in every part of the kingdom.

Agriculture has been conſidered of national importance by the moſt diſcerning part of mankind in all ages.

Every civilized nation, at one period or other, have been convinced of its intrinſic excellence; and the wiſeſt men, of every age and country, have unitedly beſtowed the higheſt encomiums on it. In the preſent times, we have the ſatisfaction of ſeeing, that the noble, the wiſe, and the learned, do not think it beneath them to reſcue it from that obſcurity in which it had long been involved, and to bring it forward to public view, under the ſanction of their own practice.

But it is not the purpoſe of this Eſſay to write an eulogium on the dignity and utility of Huſbandry, either by adverting to the diſpenſations of God himſelf towards the Jews,* or by extracting from the writings of the moſt eminent men, ancient and modern. This is needleſs. Rather let us collect ſome of their beſt ideas concerning the means of advancing Agriculture to the higheſt perfection, and thereby fulfil, if poſſible, the purpoſe of this eſſay, which, it is hoped, will recommend itſelf to the attention and regard of the public, merely from the importance of the ſubject.

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* Vide S. S. paſſim, particularly Lev. 25. The command in this chapter, that every ſeventh year ſhould be a year of reſt, or fallow, to the land; and that the produce of the ſixth year ſhould ſupply the nation for three years, had a peculiar tendency to make the Jews *ſkilful*, as well as induſtrious, in works of huſbandry; and I believe, it is pretty well known to every ſkilful cultivator, that land well tilled, dreſſed with proper manures, and ſown or planted with a judicious rotation of crops, will ſcarce ever ſtand in need of a fallow, till the ſeventh year at leaſt; and that the labour of the ſixth year will be peculiarly bleſſed to ſuch an huſbandman. Thus much, however, is certain, that ground, cultivated as above, will frequently reſiſt the ill effects of intemperate ſeaſons, by which neighbouring fields greatly ſuffer when under unſkilful and indolent management.]

Julius Cæſar,* ſpeaking of the manners of the Germans in their rude uncultivated ſtate, makes the following inſtructive obſervations, which are applicable indeed to all people in ſimilar circumſtances. ‘ Agriculture they diſregard; their diet ‘ conſiſting chiefly in milk, cheeſe, and fleſh: for ‘ none of them have any certain quantity of ground, ‘ or even country, which they can call their own. ‘ But their magiſtrates and chiefs allot, for one ‘ year only, among the ſcattered inhabitants,† and ‘ their tribes, who aſſociate together, ſuch a portion of land, and in ſuch a diſtrict, as they think ‘ proper; and then oblige them to reſide at ſome ‘ other place for another year. They aſſign ſeveral reaſons for this conduct:—That the people ‘ might not be induced to exchange the ſtudy of ‘ war for that of huſbandry;—that they might not ‘ wiſh to increaſe their ſettlements, and ſo the ‘ ſtronger expel the weaker from their poſſeſſions;

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* De Bell. Gal. lib. 6. cap. 22.

† Gentibus. On this word ſee a judicious criticiſm of the Monthly Reviewers, in their account of Holdſworth's remarks on Virgil, for June 1768, p. 426.

‘ that

'that they might not erect any buildings, except 'barely to keep out heat and cold, &c."

A country will be cultivated only in proportion as its inhabitants advance in civilization. Nations will not begin to civilize themſelves, till they ceaſe migrating from place to place: neither will a man attempt to cultivate any ſpot, 'till he can ſay THIS IS MINE. But when men unite together for mutual protection and advantage, and ſettle in one place, the cultivation of that ſpot immediately becomes neceſſary, that it may ſupply them with the conveniencies of life. Property, therefore, muſt be gained and defined, ſettled and ſecured. Theſe are circumſtances on which the advancement, if not the very exiſtence, of Agriculture depends.

But theſe are not all. There are two others of equal importance to its improvement and proſperity; the one is, the *fruit* of a man's labour muſt be ſecured to him: the other, that as the wants of men increaſe in conſequence of civilization, the earth muſt be encouraged to yield proportionable ſupplies.

This, however, can be effected only ſo far as the powers of the human mind are enlarged in conſequence of civilization. Huſbandry can riſe no higher than the knowledge of thoſe who are engaged in it will permit. It hath been indebted for its principal improvements, not only to the *natural* abilities of the cultivator, but to an *education* formed upon an acquaintance with other branches of ſcience.

Whenever any of the above circumſtances fail, Agriculture muſt feel a ſtagnation:—in proportion as they are regarded, will be the progreſs made in it, and its ſucceſs.

This appears to be the caſe in fact: for theſe circumſtances, eſpecially the laſt of them, were not heretofore ſufficiently attended to by this nation; which will fully account for the defective ſtate of huſbandry in former times, its ſlow progreſs, and its preſent improvements; while *it alſo points out the moſt probable method of carrying it ſtill nearer to perfection.*

If we expect to find Agriculture in a thriving ſtate before the Reformation, we ſhall be diſappointed: it was indeed conſidered of importance; but *the fruit of a man's labour was not ſecured to him; and the nation was immerſed in groſs ignorance.*

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The feudal conſtitution, the military diſpoſition of the people, the tyranny of popiſh eccleſiaſtics, were unfriendly to ſkilful and vigorous cultivation.

There was no great encouragement for the owners of eſtates to exert themſelves in the cultivation of them, while others were to reap the fruit of their labours: this was, therefore, left to their meaner vaſſals, whoſe ſpirits were ſufficiently humbled to ſubmit to almoſt any impoſition. The ſame reaſon which is to be given for the uncultivated ſtate of Italy, though in itſelf the garden of the world, may be aſſigned for the general diſgrace into which rural œconomics had fallen in England, till the time of the Reformation. " For one may venture to pronounce, without prejudice, that Agriculture, *cæteris paribus*, will always flouriſh moſt in free governments and proteſtant countries."*

In ſuch a ſituation of things, when Agriculture was, as it were, baniſhed into deſarts, and in every reſpect took up its reſidence among mountains and dales, where knowledge had made ſmall progreſs;—when the mind of the peaſant was not enlightened by the rays of ſcience; when he tilled the earth merely by the labour of his hands and the ſweat of his brow, without any fixed principles; it is not to be ſuppoſed, that any conſiderable improvement could be made by him.

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* Harte's Eſſay I. p. 67.

Nor was this all. Admitting that the principles of vegetation had been accurately delineated to his view, or experiments founded thereon propoſed, it was not for him to inveſtigate the one, or practiſe the other, while eccleſiaſtical tyranny prevailed, and he knew that the prieſthood would reap the far greater part of the fruits reſulting from his labour.

Tyranny over the mind will ever retard the progreſs of every kind of knowledge.

But even after the Reformation, altho' many of the arts and ſciences were cultivated with peculiar ſpirit, Agriculture did not receive encouragement proportioned to its great importance. Every thing cannot be attended to at one time. A new world had been diſcovered, which opened the brighteſt proſpects to theſe kingdoms, and the attention of England was fixed chiefly on trade and commerce. This circumſtance, which for a while appeared to be a principal impediment to huſbandry, and was the cauſe of little attention being paid to

Fitzherbert,* proved in the event one of its principal promoters. By commerce, the various productions of different parts of the earth have been brought into this kingdom, and intruſted to the care of the ſkilful botaniſt and gardener, who, having naturalized them to this climate, commits them to the care of the huſbandman. In return, Agriculture has ever ſince been aſſiſting commerce in the increaſe of corn, hemp, flax, madder, &c. &c.; and in proportion as both have been attended to, it is evident they have mutually aſſiſted each other.

But as improvements prevailed, the importance of huſbandry, in a national view, became daily more and more conſpicuous;—the diſadvantages and impediments it met with, under the management of common farmers, began likewiſe to appear. The weeds ſprang up with the wheat, and ſkill was wanting to prevent this evil.

To check theſe weeds, by enlarging the views of thoſe intended for the profeſſion of Agriculture, was the noble attempt of the great Milton, who not only recommended, but eſtabliſhed, a ſchool, in which rural œconomics were to bear a principal part in his ſyſtem of education. His pupils were to read the works of Cato, Varro, Columella, &c.* on Agriculture. But, unhappily, his loſs of ſight prevented him from realiſing in practice what he had ſo judiciouſly adopted in theory.

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* The father of Engliſh Huſbandry: made Judge of the Common Pleas about the year 1524. His book of huſbandry was printed in 1534, after forty years' attention to the ſubject, in his receſſes between the Terms.

That Evelyn, one of the moſt uſeful men of the age in which he lived, entertained the ſame ſentiments as Milton, appears from the preface to his Sylva.† To him the nation is now, and will be for many years to come, greatly indebted for the ſtrength of her navy.

To form a glorious triumvirate, we can invite the very modeſt and ſenſible Mr. Cowley, in ſupport of the ſame plan. He recommended a College to be erected in each Univerſity, and the appointment of profeſſors for the inſtructing young perſons in the principles and *practice* of this uſeful employment.‡

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* Letter to Hartlib, and Biog. Britan.

† Many millions of timber trees (beſides infinite others) have been propagated and planted at the inſtigation and by the direction of this work.—See Dedication of Sylva to Cha. II.

‡ Cowley's works, vol. II. p. 656, 7.

But, as it is always the fate of the moſt uſeful deſigns to meet with difficulties at the beginning, Agriculture itſelf began, ſoon after, to fall from its flouriſhing ſtate into national diſregard. This, however, is eaſily accounted for.

I have laid it down as a general rule, that civilization encourages huſbandry: yet it is poſſible that rural œconomics may be impeded by this very civilization, unleſs it be well regulated. A nation may be civilized to ſo high a degree of refinement, as that the politer part of its inhabitants will aſſociate in cities and towns, and attend to nothing but pleaſure and the fine arts. The conſequence is, that Agriculture will be nearly in the ſame predicament as it was before the commencement of civilization.

In ſuch a ſtate of *falſe* refinement, the cultivation of land will be conſidered as beneath the notice of the rich and the learned, and be left to the ruder part of the people.

Such was the ſtate of this nation in the reign of that gay Prince Charles II.; and could any thing elſe be expected but that Agriculture muſt ſeverely ſuffer, in an age ſo deeply immerſed in luxury, pride, and diſſipation? eſpecially if it be conſidered that the perſons, who paid the cloſeſt attention to it, had "crept into the confiſcated eſtates of "the nobility, gentry, and clergy," and were many of them originally in very inferior ſtations.

At that period, the maxims of the celebrated Bacon, the example of Milton, the efforts of the Royal Society, the propoſal of Cowley, the complaint of Evelyn, and his juſt obſervations on the neceſſity of an enlarged education, in order to improve the lands of England, were exhibited in vain.

It was to little purpoſe that the miniſtry, after the Reſtoration, permitted the exportation of wheat:* it increaſed *tillage*, but did not improve *the mode of culture*; or reconcile the nobility and gentry 'to what had been the object and care of 'mean and deſpiſed perſons.'

Thus Agriculture fell into diſrepute, and was driven back again to the mountains and vales, where Fitzherbert firſt found her; with this difference only in her circumſtances, that ſhe might be more eaſily recalled by the writings which were extant, whenever the nation ſhould be reſtored to its characteriſtical ſedateneſs.

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* Combrune's Hiſtory of the Prices of Corn, Ann. 1663 and 1670.

Whenever any ſcheme of real utility and national importance is formed by men of genius and true patriotiſm, the worſt kind of impediment it can meet with is, that of national ſupineneſs and inattention. If it be not actually oppoſed, it is not promoted; and if people do not reflect on it, they cannot ſee its importance.

Nothing, however can totally check the vigour of great minds. Evelyn, in the midſt of this general indifference, publiſhed, in the year 1675, his *Terra*, or, a *Philoſophical Diſcourſe on Earth*,* which, with the aſſiſtance of former publications, began to open the eyes of his countrymen to their true intereſt, to the dignity of his ſubject, and the neceſſity of *more than a ſuperficial knowledge*, in order to make improvements in it.

The next writer we ſhall mention is, Lord Moleſworth, who, in his *Conſiderations for the pro-*

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* In 1778, Dr. A. Hunter re-publiſhed this work with notes.

moting of Agriculture, and employing the Poor, makes the following judicious remarks, quite in point to the purport of this eſſay. " As to Agriculture, I would humbly propoſe that *a ſchool for huſbandry* ſhould be eſtabliſhed in every county, wherein a maſter well ſkilled in Agriculture ſhould teach at a fixed yearly ſalary: and that Tuſſer's old book of huſbandry ſhould be taught the boys to read, to copy, and get by heart; for which purpoſe it might be reprinted."*

Complaints of the impracticability of illiterate peaſants making any conſiderable improvements in rural œconomics, and the neceſſity of aſſiſting them, began now to be as general as juſt; being founded on facts and ſad experience, which were pregnant with many pernicious conſequences. It was clearly ſeen, that they could not deviate from the beaten track; were not capable of reflecting on the nouriſhment of plants, in order to increaſe vegetable food by judicious and frequent ploughings and ſuitable manures; of introducing new claſſes of vegetables, however advantageous; or of making any experiments on ſcientific principles; eſpecially as they knew, that if *theſe* failed, they ſhould riſque the failure of their rent. On all accounts, therefore, they muſt continue in the courſe marked out by their anceſtors, however defective and injudicious.

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* Dublin, Ann. 1723, Harte's Eſſay I. p. 156.

Theſe imperfections having been long obſerved and lamented, ſeveral gentlemen of public ſpirit (the leader of whom was the famous Tull) took their eſtates into their own hands, and cultivated them with—'ſpirit, taſte, and ſenſe,'—by regulating the courſe of crops according to the nature of the ſoil—by baniſhing waſteful fallows,*—by deſtroying weeds—by ſtirring and pulverizing the earth while a crop was growing, and thereby preparing it for the immediate reception of a ſucceeding one—by introducing new plants for the better ſupport of man and beaſt in winter as well as ſummer, &c. But, unhappily, theſe capital improvements remained for a long time within the circle of thoſe farms where they originated, or thoſe counties where ſuch public-ſpirited gentlemen had ſet the example by their own practice.

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* We cannot fully coincide with Mr. Tull, in the idea that *all* fallows are *waſteful.* We readily grant, that by a judicious ſucceſſion of crops, and ploughings often repeated, the annual quantity of fallow-ground might be greatly reduced, without impoveriſhing the ſoil; but we ſtill think that *ſome* fallows are annually neceſſary, eſpecially where the land is naturally poor.

Theſe modes of cultivation were novel; on *this* account they were ſlighted, if not derided, by the generality of the common farmers. The principles. on which ſuch culture was founded were above their comprehenſion; it muſt therefore neceſſarily be, as they fancied it, too expenſive for them to run the riſque of practiſing.

This circumſtance gave riſe to another plan, in itſelf moſt honourable and benevolent, namely, the eſtabliſhment of a Society in London for the encouragement of Agriculture, &c. who, by beſtowing large premiums for the greateſt crops on given quantities of ground, effectually ſecured the farmer under any riſk he might run. It was naturally imagined this would have anſwered the end propoſed. But if we may determine from Mr. Baily's regiſter of the perſons to whom premiums have been adjudged, moſt of the candidates have been far above the rank of common farmers.

The diffuſive plan adopted by that illuſtrious Society was intended to include every farmer; but we find it has attracted the notice of very few, except the more civilized part of them; while many pariſhes, I was going to ſay almoſt whole counties, at a diſtance from the capital, remain unintereſted about every thing relative to the Society, if not totally ignorant of its exiſtence.

However, the advantages ariſing from that excellent inſtitution excited and eſtabliſhed others of a ſimilar nature, in counties remote from the metropolis; each of which hath thrown additional light on the ſubjects of Agriculture. Many experiments and new diſcoveries* have been made, all concurring to prove that very little of the true principles of vegetation was underſtood by thoſe who had undertaken to ſupply the nation either with food or materials for carrying on the linen or woollen manufactures.

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* Here let me congratulate the public, particularly, on the invention of the *Oil Compoſt*, by the ingenious Dr. Hunter, of York, which, having tried myſelf both on wheat and turnips, growing on *very poor* ground, I found it anſwer even to admiration, particularly with regard to the latter. I think it one of the beſt preſervatives from the Fly; and can, therefore, recommend it as a valuable acquiſition, being likewiſe a good manure, where dung is ſcarce, or the carriage of it expenſive. It might be of ſignal ſervice in the improvement of waſte ground till dung can be raiſed: for, were ſuch ground to be pared, the turf dried and thrown into heaps for burning, and in the mean time the earth between the heaps ploughed carefully and to a proper depth; and, after this, the aſhes ſpread, ploughed in, and well harrowed, the turnip-ſeed ſown, and the oil compoſt ſpread by hand at the ſame time, or juſt on the appearance of the turnips, I think there would be but little danger of a good crop, if well hoed; as aſhes are peculiarly favourable to the growth of turnips: and if they were to be eaten off with ſheep, and the next courſe barley or oats, with graſs-ſeeds ſuitable to the ſoil, I am perſuaded this would prove one of the moſt ſpeedy, effectual, and cheap methods of improving ſuch waſte lands; eſpecially, if in a dry ſpring the aſhes were to be ſpread the latter end of April, and the land ſown with buck-wheat, to be ploughed

Who are the perſons that have ſo increaſed the produce of wheat, that the London Society admit no claims for the premium under five quarters per acre; although the average quantity, produced the laſt very favourable year, did not, in all probability, far exceed three quarters per acre, throughout the kingdom,* if you except the eſtates of gentlemen?

Who are the perſons that have ſo much promoted the growth of cabbages, carrots, madder, &c.

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ed in as a manure when in bloſſom, and then the turnips to be ſown, the oil compoſt ſpread, and both to be harrowed in as above. I have raiſed pretty good turnips after buck-wheat ploughed in, without the oil compoſt: but as the expence is not great, the uſing of both would perhaps be the *ne plus ultra* of improvement in the circumſtances above-mentioned. The grand fault committed after paring and burning is, taking too many exhauſting crops. A coarſer kind of oil, I am informed, is made in Cornwall, from pilchards, which would, in all probability, make the compoſt come conſiderably cheaper. For the method of making the compoſt, ſee Dr. Hunter's Georgical Eſſays, vol. I.

* In this we believe the Author is miſtaken.

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by field culture? Who have been and are likely to be, in general, candidates for the premiums of the above laudable Society? And who are they that are attending to huſbandry according to its true principles?—Not the uninſtructed farmers, who are yet but little acquainted with the ſubject as to ſeveral of its eſſential and fundamental points. They are ignorant of the various properties of different manures, and how they reſpectively operate, particularly on different ſoils; nay, on the ſame ſoils when differently circumſtanced; as well as the different *inherent* qualities of ſoils apparently ſimilar, &c. But without the knowledge of theſe properties and qualities, miſtakes have been and will be committed by farmers, and diſappointments in their crops will happen, which they know not how to account for, nor in what manner to prevent in future. A remarkable inſtance of the neceſſity of making experiments on the different qualities of ſoils, may be ſeen in the Complete Engliſh Farmer, p. 104, 5.

Were theſe things better underſtood, they would not continually manure their ground with dung, where lime and marle are eaſily procured, nor conſtantly *repeat* lime on the ſame field, becauſe it carried ſeveral good crops while abounding with vegetable food: they would not take three exhauſting crops in ſucceſſion, nor proceed in the ſame courſe of crops on every kind of ſoil.

Theſe miſtaken notions and practices cannot be removed merely by the diſtributions of premiums. The ideas of illiterate farmers will not be much rectified by many of our publications on huſbandry, which ſome cannot, and the generality are too opiniated to read: Add to this, that whoever implicitly follows the theory contained therein will often be led into errors that would end in loſs and diſappointments.

Premiums have a tendency to excite a ſpirit of emulation and induſtry to increaſe the produce of the earth, according to the different mode to which any diſtrict or county hath been accuſtomed; but a common farmer, ſhould he become a candidate, will have no more chance of ſucceeding againſt perſons of a liberal and extenſive acquaintance with the principles and practice of Agriculture, than any one of his draft horſes could have in attempting to keep pace with his landlord's hunter.

Can the bare donation of premiums give inſtruction to the mind? Ought not this to be communicated in youth, when the diſpoſition is docile? Enlarge the views by cultivating the underſtandings of young perſons while they are moſt ſuſceptible of impreſſions and free from prejudices, and they will be continually increaſing in knowledge as they grow in years; but if the mind be not improved early, the conſequence will be, in general, (for the exceptions are but very few) that they will pertinaciouſly adhere to old cuſtoms, however abſurd.

Whoever hath been much converſant with the common farmers, (and it is by *them chiefly* that our lands are cultivated) muſt have obſerved that they generally aſſociate together, communicate their ideas to each other in their own way, gain no more information from one another than the knowledge, each hath obtained, can beſtow, and that their obſervations are founded on *their own cuſtoms* in the country where they reſide. They are a claſs of people *ſui generis*, and ſtand at a diſtance, as it were, from a man of learning; and unleſs he can make himſelf very familiar with them, and converſe in their own ſtile, it is moſt probable, that they will either entirely miſtake his meaning, or inwardly ſneer at ſome expreſſions which they do not underſtand: and thus go away unimproved as they came, or reſolved not to follow his advice. Of great importance, therefore, is Education, to extend and call forth the powers of the mind, and to render it ductile and teachable!

Therefore, until Agriculture is erected on this enlarged baſis, will it not continue a vague and abſtruſe ſtudy in itſelf, and remain far ſhort of that degree of perfection, which our public-ſpirited and uſeful Societies would wiſh to ſee it attain?

If Agriculture is to be improved by learning, why ſhould not this claſs of people, the Farmers, be better educated? They are capable of improvement. Let them be well inſtructed; and improvements in huſbandry will ſoon make their way into every village, perhaps without much aſſiſtance from premiums. However, when inſtruction is ſtimulated by premiums, the great end, I truſt, will be ſtill more effectually anſwered.

Every one who reflects juſtly muſt be ſenſible, that it is with Agriculture as with phyſic. While facts and experiments are producing and increaſing the beſt knowledge, it is neceſſary that thoſe who may hereafter engage in either of the profeſſions, be inſtructed in the firſt principles of the one, and the practice of the other.

Agriculture is a ſcience as well as an art; and ſome general ſcientific knowledge is requiſite before that art can be practiſed with any rational hope of full ſucceſs; unleſs quacks may be allowed to perform perfectly well in Agriculture, although they are continually breaking the ſixth commandment in phyſic.

Mr. Young, indeed, obſerves, that "experience is an admirable foundation for any kind of ſtructure; but in Agriculture ſhe muſt be the ſtructure itſelf, not the foundation."*

But I would have taken the liberty to aſk, what is to be the foundation of this ſtructure? had not Mr. Young himſelf pointed it out, when he ingenuouſly confeſſes, "in many inſtances I have been a very bad farmer, and acted contrary to the dictates of good huſbandry."†

No one will pretend to deny that experiments are the life and ſoul of huſbandry; but they muſt not be made at random; for to what can ſuch experiments tend, except to the frequent diſappointment of the farmer, and to the public loſs?

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* Experimental Agriculture, pref. p. 15.

† Ibid. p. 6.

Indeed the encomium which Mr. Young hath ſo juſtly paſſed on Dr. Home evidently proves, that the practical part of Agriculture muſt receive conſiderable benefit from ſcientific knowledge.

It is hoped, that theſe remarks will not be conſidered as a cenſure on Mr. Young, or ‘ as a cavil ‘ at excellence.’ They are intended only to place this ſubject in the moſt enlarged point of view.

However ſhort and defective the above account of the ſtate of Agriculture in this kingdom at different periods may be; yet I hope I have made it appear—that it is much indebted for its preſent improvements to learning and civilization—that whatever deficiencies it ſtill labours under, they are owing to a defect in the education of farmers in general—that it hath a cloſe connection with other branches of ſcience—that learning and experiments muſt go hand in hand—that the propoſals of thoſe ſenſible and learned men above quoted, for eſtabliſhing Schools of Agriculture, were founded on enlarged views, ſubſtantial grounds, and the greateſt propriety—and that the little attention which has been paid thereto can be attributed to nothing elſe but certain temporary circumſtances, which retard improvements of one kind or other in every age.

Agricultural Societies were not eſtabliſhed when thoſe gentlemen wrote: and it can hardly be ſuppoſed that, whatever propriety or utility there might have been in their plan, they alone could ſuddenly turn the regard of the nation to a ſubject of which it had then ſcarce any idea.

The caſe is now otherwiſe. Agriculture hath ariſen like a ſtar of the firſt magnitude in our hemiſphere; and many of the wiſe men of our nation, of all ranks, are continually turning their eyes towards it. They are attracting the notice and regard of their neighbours, in their truly noble ſpirit and conduct.

Let this ſpirit continue to prevail; let Agriculture be ſtudied by gentlemen of landed property, on philoſophic principles; let it be taught to their tenants; and the happy conſequence will ſoon be apparent throughout this iſland.

The *difficulty* of inſtituting Schools for Huſbandry, is now trifling, ſince ſo many Societies have been eſtabliſhed and are ſupported with ſo much liberality; eſpecially ſince the *Society of Arts, Manufactures, and Commerce*, is annually offering ſuch vaſt ſums of money for the encouragement of experiments; and none of the other Societies, I ſhould apprehend, are formed on ſo ſmall a ſcale as to preclude the practicability of taking into their hands a few fields, (and a few would be ſufficient) and of appointing ſome perſon or perſons to cultivate them, and inſtruct the pupils, either according to the idea of Lord Moleſworth, which points to the education of poor men's children; or, according to the ideas of Cowley and Sir William Petty, which reſpect the education of gentlemen's ſons as well as others.

At preſent, however, let us attend to the *advantages* accruing from each of the above plans; premiſing only, that lectures on the theory of huſbandry muſt, *by all means*, be accompanied with a cloſe attention to the practical part of it, in ſuch a manner as may tend to correct the miſtakes of ſpeculation, to open and enlarge the mind, and to give a clearer inſight into the nature of vegetation, and the very fundamental principles of Agriculture.

Were Schools eſtabliſhed in different parts of the kingdom for the education of farmer's ſons who might be but in low circumſtances, gentlemen would never want ſenſible and rational improvers of their eſtates, who would likewiſe be the moſt proper perſons to inſtruct pariſh apprentices and inferior ſervants. This the old-experienced Varro reckoned to be of principal importance. 'The 'bailiffs,' ſays he, 'ſhould be men of ſome erudi'tion and ſome degree of refinement.' But more eſpecially ought a bailiff to be *well ſkilled* in rural œconomics: he ſhould not only give orders, but alſo work himſelf; that the labourers might imitate him, and be convinced it is with propriety he preſides over them, becauſe he excels them in the practical part, as well as the ſcientific.*

Were this the caſe with us, local and eſtabliſhed cuſtoms would be regarded no farther than they are founded in propriety; younger ſervants would be accuſtomed to a variation in their methods of culture as *circumſtances* varied; new modes will not be deſpiſed, becauſe they *are* new; the effects of experiments would be modeſtly expected; the advantages and diſadvantages attending them, would be accurately diſcerned; and a continual progreſs would be made in the ſcience and practice of Agriculture. Were ſome ſmart boys ſelected by each Society, and educated on the above plan, they would hereafter convey knowledge wherever they went; and their obſervations would be better attended to by inferior ſervants, than if they came from perſons of high rank. In ſhort, *they* would effect what even the ſuperior knowledge of noblemen and gentlemen could not perform, who have more important objects in view than to cultivate the neglected underſtanding of every ruſtic labourer they may have occaſion to employ. Like ſmaller rivulets, branching from the main ſtream, they would water and fertilize thoſe lands where a larger river cannot with propriety expand itſelf.

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* Qui præſint, eſſe oportere qui literis ſint et aliqua humanitate imbuti.—Præterea potiſſimum eos præeſſe opertet, qui periti ſint rerum ruſticarum: non ſolum enim debere imperare, ſed etiam facere, ut facientem imitentur, et ut animadvertant eum cum cauſa ſibi præeſſe, qui ſcientia præſtat et uſu. Lib. 1. cap. 17. apud Authores de Re Ruſtica. Edit. Jucundi Veronenſis, 1529.

While under tuition they will learn the expediency of a clean and ſpirited ſyſtem of huſbandry; as it is ſuppoſed that their tutor's fields will be cultivated on theſe principles. On comparing his crops with thoſe of many others, the truth of Heſiod's maxim would be apparent, that *half may be more than the whole.** For ſhould they think of becoming tenants, they will view an eſtate with this ruling principle, that one of an hundred pounds per annum, well cultivated, will produce at the end of the term more clear profit than another of two hundred a year, treated in a negligent and ſlovenly manner.

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* Πλὲον ἧμισυ παντος. *Opera et dies*, v. 40.

An injudicious courſe of cropping, imperfect tillage, partial and improper manures, are not always to be attributed to ignorance, but ſometimes to the eſtates being too large for the farmer's capital; he does not command the eſtate, but the eſtate him, too frequently to the great injury of both; his hands are bound at his firſt ſetting out; and it is much if they regain their freedom, unleſs eventually through his landlord's diſtraining him for rent and ejecting him from the premiſes. But what is the farmer to do if he cannot find a farm in his own neighbourhood ſuitable to his capital? Shall he remove into another county, an entire ſtranger; or commence day-labourer, or ſtarve?

The modern practice of throwing ſeveral ſmall farms into one, is much to be lamented as a national evil in every view; and calls loudly for the regulation of the legiſlature.

But to return to our young farmer, tranſplanted from the nurſery, where his mind received its firſt cultivation, unto the ſpot where he is ſuppoſed to fix his reſidence.

While under inſtruction, he was taught to form a pretty good judgment of the qualities, ſuch as the tenacity, dryneſs, or moiſture of different fields, from the herbage they ſpontaneouſly produce; he will, therefore, immediately perceive which are moſt proper to be *firſt* under tillage, in order that *the eſtate may not be impoveriſhed.* The want of attention to this circumſtance has kept many a man poor all his days, under a notion, that the beſt ground will carry one or two good crops of exhauſting corn at firſt, and ſo far prove of immediate great gain; not conſidering, that it generally proves a future heavy loſs, from the neceſſity he will be under of letting it lie fallow, and of applying much expenſive labour in order to extirpate weeds, and much more expenſive manure in order to recover its loſt ſtrength. Yet ſtill, there is a certain vigour in thoſe fields, which have been under a judicious courſe of meliorating crops, though but moderately manured, which even a fallow and a complete ſtercoration cannot beſtow on any ſoil which hath been once impoveriſhed; as may be more eaſily perceived by a diſcerning eye, than deſcribed.

Our farmer hath been taught, that the good ground (on which his chief dependence is for paying his rent) if preſerved in good heart, will often mend the bad; but the impoveriſhing of one or two of the beſt fields will frequently affect the whole eſtate in the decreaſe of its paſture, in leſſening the quantity of manure, and increaſing the expence of tillage.

It hath frequently been inculcated on him, That his future ſucceſs depends much on his firſt courſe of crops;—that at firſt, eſpecially, meliorating crops are to be preferred, as far as circumſtances will admit, to exhauſting ones;—that the latter, whenever they are ſown, ſhould be ſucceeded by the former;—that thoſe manures which are moſt apt to produce *weeds*, ſhould either be laid on paſture, or ploughed in for ſuch crops as can be beſt hoed, or have the beſt tendency to deſtroy them, viz. beans, peaſe, turnips, cabbages, &c.—that, although ſome of theſe crops may require rather more expence, and not return that expence in money quite ſo ſoon as ſome of the exhauſting ones, (part of them being appropriated to the fattening of cattle, by which means, the beſt of manure is raiſed and in the largeſt quantity) yet like thoſe bees which travel fartheſt, and ſtay out longeſt, they generally return home moſt deeply laden;—that the dung-heap be moſt ſeduloufly regarded as the foundation of his future wealth;—but that no manure ſhould be laid on wet ſpringy lands before they have been drained, unleſs he chuſes to ſink the profits of all his other fields.

He hath been taught to venture on ſome few experiments, on general fixed principles; which, though they might not all of them perfectly anſwer his expectations, may, nevertheleſs, throw additional light on the ſubject of Agriculture. In a word, he will become fit company for a gentleman; he will receive and communicate information; and at the ſame time, on account of that cloſe attention which he finds requiſite, in order that he may pay his rent, he will be continually increaſing that important knowledge which an uninſtructed mind cannot poſſibly attain.

Such an inſtitution as is here recommended may poſſibly be of ſervice to thoſe farmers who have no particular connection with our Agricultural Societies; whoſe fields, however, lying open to the continual view of their neighbours, will be a conſtant leſſon to thoſe who moſt need inſtruction, ſpeaking much more intelligibly to *them*, than accounts of experiments ſtated on paper; againſt which they will be frequently ſtarting that particular kind of doubt, which I have found to be generally expreſſed in ſome ſuch language as this, *It may be ſo, but I don't know*:—a doubt ariſing from a cloud inveloping their minds, which the powers of reaſoning are very ineffectual to diſpel. But they will ſometimes learn that leſſon from the plants of the field which they might not chuſe to learn from the tongues of their fellow-creatures, becauſe they will not avowedly acknowledge others to be their ſuperiors in this art and ſcience.

The advantages of ſuch an Academy for the education of Gentlemen's ſons, will be no leſs evident with regard to themſelves, their poſterity, and the nation in general.

On this part of our ſubject, my learned maſter thus expreſſes himſelf:—" According to the beſt obſervations, the proper time to infuſe that uſeful part of natural philoſophy called Huſbandry, is in the earlier ſtage of life, when there is curioſity and a thirſt for knowledge. And, if practice here could be joined with theory, enjoying the open air, exerciſe, and activity, agree well with the turn and caſt of young people, not to mention a revolution of perpetual variety which is very engaging at their age.

" It is one point gained, without doubt, to be enabled to read the huſbandry works of Cato, Varro, Virgil, and Columella, with taſte and knowledge. It may open a new walk on claſſical ground; and, in all probability, give young men certain prediſpoſitions in favour of Agriculture. Yet ſtill, the whole combined together will produce but ſlight effects, unleſs we call in the aſſiſtance of facts and experience.

" Something of this kind ought certainly to be done, and the complaint of Columella, when he ſays with ſome degree of warmth, " Agricolationis " doctores qui ſe profiterentur neque diſcipulos " cognovi,"* ſhould, if poſſible, be removed."

The former part of this quotation evidently intimates, that the improvement of young gentlemen in claſſical learning would not be impeded, but rather promoted, by attending to Agriculture; and the experience of every one who has led a ſtudious life will teſtify, that the open air invigorates the mind, and prepares it for receiving inſtruction, becauſe it can bear application only to a certain degree, and ſtands in need of being frequently re-invigorated by amuſements and lighter ſtudies.

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* Harte's Eſſay I. p. 157.

Time is precious, and might be virtually lengthened by a proper diſpoſal of it. When the mind is fatigued with cloſe application, exerciſe in the open air will renew its ſtrength and activity. Additional to their being taught the value of the different fields over which they may walk with their tutor, from the various plants each field naturally produces, Botany may be attended to as a pleaſing and inſtructive ſcience; neither ſhould planting and gardening by any means be neglected; nor the art of ſurveying and delineating eſtates be conſidered as beneath their notice.*

In bad weather they may be occaſionally amuſed with experiments on various branches of natural philoſophy;—the effects of the air with regard to vegetation, and the nature of different earths and manures, after the manner of the Doctors Home, Fordyce, Ainſlie, Prieſtley, &c.

They ſhould alſo be inſtructed in the principles of Mechanics, eſpecially that part which relates to Hydraulics, it being of principal utility in draining and other modes of improving eſtates.

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* It is not meant wholly to exclude the ſons of poor men from theſe ſtudies.

Theſe are circumſtances from which many of the capital improvements lately made, in a great meaſure, originated. They were indeed conſidered of principal importance by Sir William Petty, 'one of the greateſt men of that or any other age,'* who recommends them with earneſtneſs, for reaſons highly worthy of himſelf, and which will be mentioned hereafter.

Having gained ſome knowledge of Agriculture, they will read the works of the ancient agricultural writers with improvement and pleaſure; a circumſtance which will much expedite the knowledge of the languages. For without excluding other proſe authors, may I not venture to aſſert, that the ancient writers on huſbandry are, from the nature of their ſubject and their claſſical ſtyle, as proper for young perſons, and as ſuitable to their diſpoſitions and capacities, as any they generally read? Indeed I have always been apt to ſuſpect, that putting the works of Homer, Horace, Virgil, Ovid, or in fact any other *poet*, into the hands of boys, before their minds are properly furniſhed, and their taſte and judgment ſufficiently advanced, to enter into the ſpirit of thoſe excellent writers, has been only rendering learning irkſome to them, and proved the means of their bidding a final adieu not only to thoſe authors, but to all claſſical literature, when they have left their grammar-ſchools; not to mention that *proſe* writers ſeem, in themſelves, beſt calculated to teach any language by, as well as to convey the moſt uſeful information to the minds of youth.

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* Biog. Britan. Article Boyle.

Poetry and painting are ſiſter arts; they alike receive advantages from rural ſcenes: witneſs the ſix paſtorals of Mr. Smith, than whom, as a landſcape-painter, and as a poet, this age hath not, perhaps, produced a greater.

The following is one inſtance, among many others, to prove how favourable an intimate acquaintance with rural images is to poetical deſcription:

> " The night was ſtill—the ſilver moon on high
> " Dappled the mountains from a clouded ſky;
> " Silent as fleecy clouds thro' æther ſail,
> " Before the gentle-breathing Summer's gale;
> " So thro' the miſty vale in twilight grey,
> " The ſleepy waters gently paſs'd away."——

Engaging in rural concerns will ſtrengthen the whole human frame, the powers of the mind, as well as the members of the body; will give a manly turn to thought, duly regulated and refined by polite literature. A perſon thus educated will never want a variety of entertainment in the country to fill up his time in a manner equally innocent, rational, and uſeful. He will be continually increaſing in valuable knowledge, and preſerve himſelf from that diſſipation which enervates the mind, renders retirement burthenſome, and the more public and momentous concerns of life too arduous to be executed with propriety and decorum. He will enjoy his *otium cum dignitate*, and, at the ſame time, his private amuſements will give a certain dignity and poliſh to his ſentiments, which on all occaſions he will be the better enabled to expreſs in public, with a truly Britiſh ſpirit, Roman firmneſs, and Attic elegance. There will appear in his whole manner and addreſs that *ſimplex munditiis* which is equally removed from empty affected foppiſhneſs and mere clowniſh ruſticity. He will be fitted for ſuch department in the government of the ſtate as may beſt ſuit the natural bent of his genius, whenever his aſſiſtance may be thought neceſſary; and may rank hereafter among thoſe worthies who have acted the ſame part before him, and whoſe eulogium may be delivered in the words of the Roman orator: " Ab " aratro arceſſebantur qui conſules fierent—Suos

" enim agros ſtudioſe colebant, non alienos cupide " appetebant, quibus rebus, et agris et urbibus et " nationibus rempublicam, atque hoc imperium " et populi Romani nomen auxerunt."*

But to return into the more humble walk of cultivation and emolument.

When our young pupil ſhall come to the poſſeſſion of his paternal eſtate, he will immediately perceive what is to be done to the beſt advantage; he will be able to *direct* his ſervants, rather than be *impoſed* upon by them, which muſt ever be the caſe when the maſter is unacquainted with the buſineſs he ſuperintends. This is a matter of high importance. For, if in any other profeſſion he ſhould ſpend his fortune, it is poſſible he may be the *only* ſufferer; but it is not ſo in Agriculture. Every field is, in ſome reſpect, public property; and if his crops fail through unſkilful management, whatever is loſt by the owner is, in ſome degree, a loſs to the community at large.

When I reflect on this, and conſider how much the crops are diminiſhed through the miſtaken notions and obſtinacy of the common farmers, eſpecially when they rent larger eſtates than they have ſtrength to manage; and when I view the almoſt immeaſureable quantity of improveable land which yet remains waſte and next to barren; I cannot but agree to the ſuppoſition of Mr. Harte, that the lands of England may be made to produce one-ſixth part more than they do: a point this of great national importance, amounting to near four millions of money annually!

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* Orat. pro Ligario.

Whatever advantages may accrue to Gentlemen from committing their eſtates to the management of ſuch a ſkilful and well-educated bailiff as hath been above recommended, yet they ſhould not be left *wholly* to him; for experience hath too often ſhewn, that the integrity of a man's heart does not always keep pace with his underſtanding. Indolence, ſelf-intereſt, pleaſure, and other temptations, may cauſe him to neglect his maſter's intereſt at a critical time; the evils of which neglect may not be remedied for years together. Every one who hath attended to works of huſbandry muſt be ſenſible, that in all their ſeveral parts they are only links of one chain; either of which being broken, the whole work is frequently thrown into confuſion, particularly with regard to the moſt proper ſeaſons for the different labours of the field;—a circumſtance of no ſmall moment in our varying climate.

This ſentiment ſhould be impreſſed with all poſſible energy; and it cannot be done in more forcible and comprehenſive terms than thoſe of Cato, "Res ruſtica ſic eſt, ſi *unam rem* ſerò feceris, "*omnia opera* ſerò facies."

It is likewiſe to be obſerved that, although the Gentleman's crops may, in many inſtances, be larger than thoſe of other men; yet, by truſting too much to his ſervants, he is often put to needleſs expence, which the common farmers avoid, and on account of which they object to the propriety of his method; ſo that hereby the public-ſpirited Gentleman ſometimes hurts the cauſe he intends to ſerve.

However, the well-educated bailiffs are more likely to do their maſters ſtrict juſtice than the illiterate; thoſe little meanneſſes which the latter hardly think any thing of, though frequently attended with conſiderable diſadvantages, the former are in general above committing, becauſe the know better.

Indeed I cannot conſider the ſtudy and profeſſion of Agriculture as any way unbecoming the character of a Clergyman; he may hereafter prove of great ſervice to his country pariſhioners, as his advice and method of proceeding would be readily attended to by the younger part of his pariſhioners, and he will have frequent opportunities of conveying juſt ideas of improving their modes of cultivation. Thus the knowledge of Agriculture may be diffuſed in every part of the country, where ſuch a gentleman fixes his reſidence. Should his cure be but ſmall, he will have a fair opportunity of preſerving himſelf from that dependance, which might too often leſſen the weight and energy which ſhould always accompany his religious inſtructions.

It was thought proper to reſerve Sir William Petty's *Advice for the advancement of Learning*,* for this place; becauſe his plan is in itſelf highly judicious, and includes the ideas of Cowley and Lord Moleſworth.

Sir William propoſes,

"That there be inſtituted literary work-houſes, where children may be taught as well to do ſomething towards their living as to read and write.

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* Publiſhed in 1648.

“ That the buſineſs of education be ſeriouſly ſtudied and practiſed by the beſt and ableſt perſons.

“ That all children, above ſeven years old, may be preſented to this kind of education; none being excluded by reaſon of the poverty and inability of their parents; for hereby it hath come to paſs, that many are now holding the plough, who might be made fit to ſteer the ſtate.*

“ That all children, though of the higheſt rank, be taught ſome genteel manufacture, in their minority, or turning of curious figures, &c. limning and painting on glaſs or in oil colours, botanics and gardening, chymiſtry, &c. &c.

“ And all for theſe reaſons:—They ſhall be leſs ſubject to be impoſed upon by artificers; they will become more induſtrious in general; they will certainly bring to paſs moſt excellent works, being, as gentlemen, ambitious to excel ordinary workmen. They being able to make experiments themſelves, may do it with leſs charge and more care than others will do it for him. It may engage them to be Mæcenas's and patrons of arts.

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* Cincinnatus was called from the plough, in order to ſteer the ſtate as Dictator; and returned to it again after he had delivered Rome from her danger.

It will keep them from worſe occaſions of ſpending their time and eſtates. As it will be a great ornament in proſperity, ſo it will be a great refuge and ſtay in adverſity and common calamity."

After theſe obſervations, need any thing be added to ſhew the advantages of ſuch an education, except attempting to obviate an objection which may poſſibly ariſe with regard to the difficulty of procuring proper tutors?

This, however, ſeems to be a difficulty, which, in this enlightened age, may be ſoon ſurmounted. I imagine there are many perſons in the kingdom well ſkilled in ſcientific and practical knowledge, who would, were they encouraged, readily ſtep forward, and reduce Agriculture (both in theory and practice, with all its connections and dependencies on botany, chymiſtry, and other branches of natural philoſophy) into a ſyſtem of education as regular, plain, and introductory to right conduct, as in any other art or profeſſion in life. Let it but have a beginning, and inſtructors would, no doubt, ſoon abound.

The Author will not be wanting in any thing which lies in his power, however ſmall, to promote ſo deſirable an end.

And with this declaration he ſubmits the foregoing obſervations to the judgement of the wiſe, the candid, and benevolent.

ADVERTISEMENT.

IN order to render the ſtudy of Agriculture more general, eſpecially among the riſing generation, the Author propoſes, ſhould it be thought eligible, to publiſh, for the uſe of ſchools, an Abridgement of the writings of Cato, Varro, and Columella; by ſelecting ſuch paſſages as ſeem more eſpecially adapted to the huſbandry of theſe kingdoms, and to be of public utility.

This advertiſement owes its exiſtence to Mr. Aikin's edition of *Selecta Quædam ex Plinii Hiſt. Nat.** which cannot but be conſidered as a very valuable addition to our ſmall ſtore of Claſſic Authors, proper for the uſe of ſchools.

It is thought that a judicious ſelection from the writings of the three Authors above-mentioned, if well *tranſlated*, would be of ſervice.

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* Select paſſages from Pliny's Natural Hiſtory.

A
LETTER
TO
MONSIEUR HIRZEL,
FROM
DOCTOR TISSOT;
IN ANSWER TO
MONS. LINGUET's TREATISE
ON
BREAD-CORN AND BREAD.

PRESENTED TO THE SOCIETY IN FRENCH

By Sir JOHN PRINGLE, Bart. P. R. S.

AND TRANSLATED BY A MEMBER.

SECOND EDITION.

M DCC LXXXIII.

BIBLIOTHECA BODLEIANA

TRANSLATION

OF A

LETTER FROM DOCTOR TISSOT TO MONS. HIRZEL.

HAVING frequently received much information from the works of Monſ. LINGUET, I always read them with pleaſure and with full expectation of further improvement; but, however well grounded ſuch an opinion of any author may be, it ſhould never go ſo far as to prevent a ſtrict and impartial examination of facts. The examination which I have made of his Treatiſe upon Bread-Corn and Bread,* does not permit me to adopt his opinions on two ſuch intereſting ſubjects to mankind. I even think it might be of dangerous conſequence, ſhould they become general; and when an author of ſo much genius, learning, and eloquence, undertakes to eſtabliſh an *opinion*,

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* Annales Politique, Civiles, et Literaire, tom 5, p. 429.

however

however abſurd, it may probably bias the judgment of ſome part of his readers, and be a means of perſuading them to adopt the ſame ſentiments; I therefore thought it might be uſeful to publiſh the reflections which I made in reading this ſeducing Treatiſe.

I ſubmit them to you, Sir, as to one of the moſt competent judges, engaged, both by ſtation and natural abilities, in every thing that tends to the enriching your country, and the welfare of your fellow-citizens; profoundly verſed in all the branches of Œconomics, Agriculture, and Phyſic, you will be equally capable of diſcuſſing the objections of M. Linguet againſt the uſe of Bread, and my obſervations upon them; your deciſion will certainly have very great weight in the ſcientific world.

Monſieur Linguet affirms, that the culture of bread-corn is prejudicial, and that bread is an unwholeſome food. The latter of theſe principles only can be properly conſidered in a medicinal view. However, I muſt be permitted to examine the firſt alſo; ſince it would be of very little importance to defend the uſe of bread, if the culture of the grain which produces it be prejudicial.

It is a certain fact that, in ſome countries, one arpent* of land, ſown with corn, yields leſs than the ſame quantity planted with vines, or of good meadow-land; and, according to that manner of reckoning, a diſtrict which had one thouſand arpents of arable land, would receive leſs profit from its produce than that which had one thouſand arpents of vines, or one thouſand arpents of meadow-land; however, this is not owing to the corn, but to the ſoil; for they ſow it with corn, becauſe it is not good enough for meadow-land or vineyards; and if the profits of an arpent of arable is leſs than that of meadow-land, it is becauſe the ſoil of the one is not ſo rich as that of the other. If corn were ſown on a ſoil naturally good, without the help of manures, I am perſuaded that more advantage would always accrue from arable lands than from meadow; the ſame compariſon cannot be made with reſpect to vines, becauſe they

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* I am obliged to uſe the word *Arpent*, as our Engliſh acre does not anſwer to it; and I know no other word in Engliſh applicable: The common arpent in Switzerland is called a *poſe*, and meaſures 40,000 ſquare feet; the *Arpent* of Paris, 100 perches, reckoning 18 feet to the perch, is 32,400 ſquare feet; but as the foot of Berne is leſs than that of Paris, in the proportion of 1500 to 1440, the Arpent of Paris contains 36,735 feet of Berne; and as the difference is but 2265 feet, one may be taken for the other, without any error of conſequence.——*N. B.* The Engliſh acre contains only 40 perches.

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muſt have a particular ſituation; but corn is more eaſily cultivated than graſs; for although they are two plants of the ſame ſpecies, the former will thrive in lands where the latter will not, or, at leaſt, it grows ſo weak and thin, as to be eaſily over-run with weeds, or dried up by the heat of the ſun; it has therefore been found neceſſary, in diſtricts where the land is not good, (which is moſt commonly the greater part) to leave the beſt for hay, and to put the corn into that which is but indifferent, or even in the worſt of all; and though they cannot expect very great crops, yet they reap ſomething.

If there are ſome diſtricts of very poor lands, almoſt entirely ſown with corn, they are not poor becauſe they produce only corn, but becauſe they are not fit to produce any thing elſe. Their ſoil is ſo bad, that they can grow but very little fodder, conſequently they maintain only ſuch cattle as are abſolutely neceſſary for labour, and thoſe are ill fed, and frequently periſh. They have but little manure, and their crops are ſmall; for large crops of all ſorts can only be expected from lands naturally rich, or ſtrongly manured. Thus the poverty of the inhabitants is only owing to their poſſeſſing an ungrateful ſoil.

What proves evidently it is the natural ſoil that is in fault, and not the corn which impoveriſhes it, is, that where there is meadow and arable land, the price of the meadow-land is much more conſiderable than that of the arable. In moſt parts of this country,* the proportion is nearly ten to one; and there are even ſome arpents of meadow, for one of which they would give thirty of field lands, and ſome of vines for which an hundred of arable land would be given. Thoſe diſtricts, where the ſoil will produce nothing but corn, are poor; but in thoſe which furniſh fodder, and alſo fine crops of grain, the inhabitants are wealthy and happy, unleſs they are oppreſſed by taxes. There are many inſtances of this kind in this country, which Monſ. Linguet has not given himſelf time enough to conſider with proper attention; and ſurely, it is moſt probably ſo in other countries. Flanders, Brabant, ſome parts of Germany and Poland, Milan, and England, which furniſh great quantities of grain, are countries abounding alſo with all the neceſſaries of life, enriched by the money which the exports of their corn bring in return. If there are many poor in them, it is not their raiſing corn that occaſions it; but the unequal diſtribution of it. Whatever commodity a country produces, if it is not enjoyed as private property, but is reaped for others, the inhabitants ſtill continue poor.

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* **Switzerland.**

In ſome provinces there are lands of very conſiderable extent ſown with corn, which belong to the church, or ſome nobleman, perhaps. The peaſant may be poor in the midſt of this opulence; but it is not becauſe there is corn, but becauſe it does not belong to him. If there are countries where they reap plentiful harveſts, and where, nevertheleſs, the owners themſelves are poor, this poverty is not owing to that plenty, but to ſome other cauſe; frequently, perhaps, their ſituation is unfavourable for vending their grain, and then, undoubtedly, it would be better to ſow leſs of it; perhaps, indeed, (almoſt univerſally) too much land is appropriated to the culture of grain. If leſs were cultivated, and the huſbandman would be more attentive to the cultivation, better crops might be produced at leſs expence: thus the advantage would be much more conſiderable.—but I ſhall ſpeak of this again hereafter. However, this proves nothing againſt the cultivation of bread-corn, ſince if it is cultivated with care, the produce will be very conſiderable. If farmers in general ſow more than double what is neceſſary; if they ſow it only in very poor land; if thoſe lands are badly prepared, and they do not allow the neceſſary quantity of manure; it will be with wheat as with all other crops; it will not grow, becauſe it has not been properly cultivated.

You know, Sir, that the experiments of Mr. Tull, Duhamel, Mougres, and many others, have demonſtrated the advantage of ſowing much leſs ſeed than is uſually ſown. Perhaps you recollect, that this method, any more than the uſe of the ſeed-bag, is not a new diſcovery, but has been proved by experience more than an hundred years.

In the Philoſophical Tranſactions for 1670, No. 60, we find a very full and particular memorial of Mr. Evelyn's; in which, after the Spaniſh memoir of M. the Chevalier Lucatello, he gives the deſcription of a ſeed-bag uſed in Spain, called a Sembrador, which the inventor, after having fully eſtabliſhed its great utility, by repeated trials, in the preſence of the Emperor, took into Spain, where the government ordered ſeveral new trials to be made, which were alſo attended with great ſucceſs. By this means, two-thirds leſs is ſown, and they reap more. The care required in the conſtruction of the plough, to which the ſeed-bag is adapted, and the work it requires, are explained very clearly; and it is very probable, that it was from thence that Mr. Tull has drawn his diſcoveries. One finds alſo in the ſame publication, that about the year 1665, the Royal Society appointed a committee, who employed themſelves in enquiring into every thing relating to the hiſtory and progreſs of Agriculture in theſe kingdoms: This committee publiſhed queſtions the moſt intereſting, and the beſt calculated to anſwer their deſigns in enquiring into all the different branches of Agriculture, in order that from a knowledge of the true ſtate of it, and from the obſervations of perſons ſkilled in œconomics, whom they requeſted to communicate their ſentiments, they might fully eſtabliſh that part of it which ſeemed to them of the greateſt importance. Theſe queſtions contained almoſt every thing that has been propoſed ſince that time; and it appears that this committee were employed without being much known, on the ſame objects which have engaged the attention of all Europe for twenty-five years paſt, with ſo much enthuſiaſm and oſtentation.

But to return to my ſubject. Suppoſing the common increaſe of wheat to be ſix and a half, as it is generally ſown at preſent, this would be thirteen to one, if only half that quantity were ſown, and this would be a very fine produce.

M. Linguet has, I think, gone too far in ſuppoſing that the culture of wheat requires more time than it really does. One arpent of wheat requires no more than four days' labour in the year for ſowing, two for reaping, and the ſame for manuring; let us then reckon ſix for threſhing, and two for grinding it; and this, in the whole, makes ſixteen days, which is all that it requires. Let us then ſuppoſe a family, conſiſting of ſix perſons, (three men and three women) three arpents would ſupply them with more corn than would be ſufficient for their ſuſtenance, and would require only forty-eight days' work; and even of theſe forty-eight days, it would be only thoſe of harveſt that would employ the women; thoſe of cleaning, weeding, or haling, if neceſſary, would employ them but two, and they would have nothing to do with the ſowing or manuring. The grinding and baking take up but little of the men's attention, neither would they be always employed in the other three parts of the work; therefore all the remainder of their time may be employed in other occupations. I am well aware, that if more land be cultivated, it will neceſſarily require more time, although the time neceſſary for the culture of arable lands does not increaſe in proportion to their extent; but in that caſe, the extraordinary time employed is making a trade of the produce, and not that which is barely requiſite to acquire a neceſſary ſubſiſtence; and this may be increaſed in any degree, even till their whole time would not be ſufficient.

Water-meadows, which alone may be deemed truly fertile, require daily care to water them at leaſt ſix months in the year; and the harveſt alſo requires much care. The culture of vines requires much more attention and time; and it is therefore ſuppoſed, that if a Vigneron can take care of a certain number of arpents of vines, the farmer can, with the ſame time and trouble, attend to a farm eight or ten times as large. I know very well, that the one requires cattle, and the other does not; but theſe cattle, far from being expenſive, will, if properly managed, increaſe the gain of the farmer; therefore, they muſt not be looked upon as an expence. Corn is ſubject to many accidents, but vines are ſubject to many more; and thoſe which the vine ſuffers, ſometimes ſpoil the vintage for ſeveral years; thoſe which happen to arable land only ſpoil the harveſt for the enſuing ſeaſon: And as the expence of cultivating vines, for which only manual labour can be employed, is much more conſiderable; therefore the Vigneron, who engages more largely than the Farmer, will conſequently be a much greater loſer, if unſucceſsful.

Hay is alſo ſubject to frequent and very diſagreeable accidents: the ſecuring it is ſometimes very difficult; and when it is badly made, it becomes very hurtful to cattle. A ſingle fact will be ſufficient to prove the caſualties hay is ſubject to, which is, that it varies in price as much as grain. Accidents of hay-mows taking fire are but too frequent, and this is not to be feared in corn-mows.

The preſervation of vines is not attended with leſs difficulty than that of grain, and the accidents they are liable to, being more ſudden, cannot be ſo eaſily prevented. When grain has been well taken care of in the harveſt, it is very ſeldom any accidents happen to it, except the mows are made very large; and even then, every one knows there are certain means of prevention. It may be ſaid with truth, that if wheat does not keep, it is the fault of the farmer: Nature has formed it for long preſervation; and this is ſo well confirmed by repeated obſervations, that it is no longer to be doubted, that wheat is the moſt durable of all eatable grain. The care it requires in grinding is common to all other ſorts of grain; and the accidents which they are liable to are as many as thoſe of wheat: their produce is not ſo certain; and, finally, the ſtraw of wheat is of more general uſe and importance than that of any other grain.

Maize and Millet impoveriſh land very conſiderably; and in thoſe countries where maize flouriſhes the beſt, the owners, when they leaſe out the farms, particularly ſpecify, that only ſuch a portion of the arable lands ſhall be ſown with maize: And in Piedmont, one of the diſtricts where they cultivate the moſt, this proportion is not to exceed the forty-eighth part.

With regard to Rice, every one knows, that it will not grow without being under water; and that four months out of the ſix that it is in the ground, the land muſt be kept flooded; conſequently the countries where rice is cultivated are very unhealthy; and in the county of Verceil, a man of forty years of age is old and decrepid.

The culture of Rice* is, therefore, detrimental, and far from being proper to be encouraged in any ſtate: they ought rather to guard againſt its being introduced; for even though it might be very advantageous in a lucrative view, yet it is certainly of more conſequence to preſerve the health and lives of the inhabitants, than to ſeek the means of enriching them. The ſovereign council of Rouſillon prohibited it about forty years ſince, becauſe they thought that the exhalations of the lands ſown with it had occaſioned an epidemic diſtemper.† Another argument againſt the culture of rice is, that it requires a conſiderable degree of heat as well as moiſture, and therefore will not grow beyond the latitudes of 46 or 47 degrees, and perhaps even not ſo far. Mr. Rye, a very accurate obſerver, has affirmed, that it diminiſhes by tranſplanting; therefore, if it were adviſable in countries where there is great plenty, it would not be ſo where it is already thin.

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* The culture of Mountain Rice would, no doubt, be very advantageous; but beſides the great uncertainty of its growing in Europe, the procuring it is attended with much difficulty, ſince the zeal and ardour of Monſ. Poivre, who firſt made it known to us, hath not been able to ſurmount it.

† Thoſe inhabitants of the mountains, who come down into the vallies of Piedmont in the autumn, to the Rice harveſt, are moſtly ſeized with the fever.

It appears then from what has been ſaid, and which may alſo be relied on from a great number of treatiſes on the ſubject, that Wheat is not a commodity that is impoveriſhing in itſelf; for, in an equality of ſoil, it is as advantageous as any other; and that this grain will grow indifferently at leaſt in lands and ſituations which are unfavourable to other plants. One may alſo add, that this grain is adapted to moſt climates; and that if there are diſtricts almoſt entirely ſown with wheat, and yet poor, it is the fault of the ſoil, or ſome other circumſtances, and not of this uſeful grain.

The compariſon between the population of ſome provinces, cultivated with corn, which are thinly inhabited, and others of vineyards and paſture-lands, which are more populous, ſimply proves this only, That one ſoil is more rich than the other, and that a fertile ſoil will maintain moſt inhabitants.

No perſon is more capable of aſſigning the cauſe of the ſubjection of the Roman empire to the Northern powers, than M. Linguet; but he cannot ſurely be ſerious, when he ſays, that they were enabled to conquer them, becauſe thoſe Northern countries produced no corn, and that population decreaſed ſince the introduction of grain.

I ſhall make three obſervations on this paſſage. Firſt; the armies of Guſtavus Adolphus, Charles the XIIth, and the King of Pruſſia, whoſe food was bread, would be as formidable againſt the Italians of theſe times, who eat leſs than was eaten in the days of Scipio, as their anceſtors were fourteen hundred years ſince againſt the Romans: And as M. Linguet ſpeaks of conqueſts, he muſt know certainly, that thoſe Greeks, who ſubſiſted on bread, thoſe Romans who ate nothing but bread and vegetables in pottage, ſubdued all the known world, amongſt whom were many nations who ate leſs bread than themſelves. The ration or allowance of bread for a Roman ſoldier was much more than what ſoldiers have at preſent; and they were alſo much ſtronger: The allowance to a Roman ſoldier was 64 pounds of wheat per month, which he was ſtrictly forbidden either to ſell or exchange: They had very ſeldom any cheeſe, bacon, or pulſe; wheat was then almoſt their only food, and the proportion was double what is allowed the ſoldiers in our days: they ate it in bread, in flour-milk, and in thin cakes; and they were not ſubject to epidemic and putrid diſorders, as is but too much the caſe with our armies at preſent. Bread-corn then did not diminiſh their ſtrength, as one may judge from the weight of the accoutrements which they carrried, neither did it make them leſs brave, or in any degree unhealthy; nay, it is very probable, that the moſt certain method of preventing epidemic diſeaſes in the army, where it is ſo difficult to procure good animal food, would be to reduce them to the ſimple diet of the Roman ſoldiery.

Secondly; It is very doubtful whether thoſe countries were more populous, than they are at this time; it is even very probable, that they were leſs ſo.

Finally; The people of theſe Northern countries were not without wheat; it was the baſis of their food and their drink: without quoting other authors who atteſt it, ſuffice it to ſay, that Tacitus affirms it in his *De Morib. Germ.* cap. 23, 25, 26.*

Monſ. Linguet's ſecond remark is, that of nine hundred millions of men, there are ſcarcely fifty millions that uſe corn for their food*; but in this he is certainly guilty of a very great miſtake, either wilfully, or through inadvertence; for, altho' there may be ſome ſmall diſtricts in Europe where

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* Portui humor ex hordeo aut frumento, cap. 23. Frumenti modum dominus injungit, cap. 25. Agri per vices occupantur, cap 26. Non contendunt ut pomaria conſerant et prata ſeparent et hortos rigent ſala terræ ſeges imperatur.——Corn then was the only object of their culture: and milk boiled with flour, wild apples, freſh game, and curdled milk, appears to have been their principal nouriſhment or food.

NOTE BY ANOTHER MEMBER.

* Tacitus's words are, "Cibi ſimplices agreſtia poma, recens fera, et lac concretum." From this Mr. Tiſſot concludes, that the baſis of their nouriſhment was corn, which is not once mentioned. It is true he has added, *bouillies de cetteſerine*; but this is a mere interpolation of a French diſh, and not to be found in Tacitus. It is probable they made uſe of corn more for the purpoſe of brewing drink, than for ſolid food. What Tacitus ſays negatively, Mr. Tiſſot has interpreted poſitively; he ſays, indeed, that all they raiſed from the ground was crops of corn, and that they neglected the culture of fruit-trees, and improving meadows. But their culture of corn muſt have been very little, when they never cultivated the ſame tract for two years together, and ſtill there was a ſuperfluity of land. "Arva perannos mutant, et ſupereſt ager." Tacitus alſo ſays, that the whole wealth of the people conſiſted in their cattle; and that all their fines and mulcts were paid in cattle. "Sed et levioribus delictis "pro modo pænarum, equorum pecorumque numero convicti mulc-"tantur." Cap. xii.—"Luitur enim etiam, homicidium certo armen-"torum, ac pecorum numero." Cap. xxi.

Beſides, it is highly improbable that a people, who lived upon corn, ſhould have no word in their language to expreſs the autumn or harveſt time of the year, as Tacitus expreſsly ſays, "Unde annum "quoque ipſum non in totidem digerunt ſpecies, hiems, et ver, et "æſtas, intellectum ac vocabula habent, autumni perinde nomen ac "bona ignorantur."

But there is another proof more directly to the point, which is, that Julius Cæſar, in his VIth Book, giving an account of the Germans, ſays expreſsly, that they did not mind Agriculture, but lived rice, maize, buck-wheat, and *cheſnuts, are the principal food of the inhabitants; yet one may aver, that there is not the ſmalleſt province, if we except a part of Lapland, where corn is not the baſis of their nouriſhment. Europe certainly contains not only fifty, but one hundred and twenty millions; and it is not in Europe only that corn is the principal food of the inhabitants.

Monſ. Linguet makes an exception to this valuable grain, by ſaying it will not ripen but in the latitudes between 25 and 60 degrees; but it is preciſely in theſe latitudes that population flouriſhes the moſt; it is there that mankind increaſe the faſteſt; the number of the inhabitants of the Torrid and Frigid Zones does not bear any proportion to thoſe of the Temperate Zones; and the ſuitableneſs of theſe climates being more favourable both

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on milk, cheeſe, and fleſh meat; and that Agriculture was purpoſely diſcouraged among them, leſt it ſhould lead to effeminacy. Add to this, that a diet of fleſh is much more ſuitable to a cold climate, than one of vegetables.

Had Mr. Tiſſot read theſe paſſages with accuracy and candour, he never could have made ſo abſurd an aſſertion.

* The uſe of cheſnuts, as food, diminiſhes daily; and it is a complaint of the œconomiſts of France, that the cheſnut-trees are much deſtroyed in thoſe provinces where they uſed to be in the greateſt plenty, in order to plant mulberry trees in their place.

to men and corn, is a ſtrong indication, that the one is deſtined for the other; beſides, there are many places in the Torrid Zone where bread-corn is cultivated; it may therefore be fairly preſumed, that it would grow in many others; and I would boldly aſk Monſ. Linguet, what other eatable grain is accommodated to ſuch a number of climates? and, above all, what grain is ſo generally known and made uſe of amongſt ſo great a variety of nations? It is found in all Europe, in Egypt, and throughout Barbary; that is to ſay, in all the moſt populous parts of Africa, in Mexico, in the moſt flouriſhing provinces of Peru, and in thoſe of North America; it is the principal food of the Engliſh colonies; and, for ſome years paſt, America has been enabled to export quantities of flour to Europe. Wheat is alſo the food in many provinces of Perſia, Môgul, and Indoſtan; and it is found in all China, where there are three provinces that have no rice. Thus you ſee, it is cultivated by all civilized and induſtrious nations.

That wheat is not uſed among ſavages, or the Arabs, is no argument againſt it; for even ſome of theſe have cultivated it in all ages, as Tacitus affirms, in thoſe countries where the ſoil will only admit of particular cultures; and eſpecially in that ſort of land which is only favourable to the manioc, the inhabitants are obliged to ſeek for means to take away the poiſonous quality of this plant, in order to make it their food; but, notwithſtanding, ſeveral perſons are poiſoned by it every year; wheat therefore is, no doubt, the moſt general food of all civilized nations; and there is the ſtrongeſt preſumption, that it is alſo the moſt advantageous to cultivate; but this would be a moſt cruel miſtake, if it were ſo unwholeſome a food as Monſ. Linguet affirms.

I am not an enthuſiaſtic admirer of bread: I have even ſaid that bad bread only, or the wrong uſe of it, may be hurtful. I alſo added, that in ſome languiſhing diſorders, even the beſt bread ought to be uſed with moderation; and there is no other food that may not be liable to the ſame objections; but it is nevertheleſs true, that of all foods, wheaten-bread, well made, is the moſt wholeſome; and I am too much attached to the preſervation, the health, and the happineſs of the people, to be ſuſpected of having given any advice on theſe three important ſubjects, without due conſideration. You will ſee in the ſixth volume of my Diſſertation on Nervous Complaints, all that I have written to diſſuade them from the uſe of l'Ergot,* a grain certainly poiſonous, which ſome able phyſicians (deceived by ſuperficial obſervations) eſteemed a wholeſome food, and which might be uſed without riſk. I write now to preſerve them againſt that bad opinion of wheat, which an ingenious and eloquent philoſopher (who from ſome few particular objections, has drawn a falſe general concluſion) might incline them to adopt. It appears to me as neceſſary that man ſhould have good bread, as it is dangerous to have bad: And it is very ſingular that there ſhould be, at the ſame time, well-meaning and learned men, who forbid the firſt as a poiſon, while others recommend the latter. Vegetables have always been neceſſary for man. No nation has ever been diſcovered who lived wholly on animal food. All have made uſe of bread, or ſome equivalent for it; that is, ſome vegetable farinous ſubſtance, which prevents the ſatiety of all animal food, and the corruption which would be the neceſſary conſequence: even the bark of fir-trees has been uſed for this purpoſe; but I do not ſcruple to affirm, that of all theſe vegetable ſubſtances, bread made of wheat is certainly the beſt. Of all the objections which M. Linguet makes againſt it, there is not one well-founded. It is very certain, that if wheat be ſimply pounded, as maize, buck-wheat, or millet, in the kneading it and baking it, much better cakes are made than from any other flour. I have already mentioned, that the Roman ſoldiers ate it in all theſe forms. None of theſe grains can be eaten green. Wheat is, undoubtedly, the leaſt diſagreeable and the beſt; but were it to be uſed without dreſſing, it might be attended with danger; and Monſ. Van Swieten has ſeen the bad effects of it: but all the other grains would be more hurtful, even were it poſſible to ſubſiſt on them. The bran, which is ſo much objected to, is only the outſide or rind: all other grains have ſomething of the ſame kind, and that of wheat is the only one which is worth preſerving. It may have the ſame objections with other grains, of being a viſcous food, (if not made into bread) difficult to digeſt, except by the moſt robuſt conſtitution, and likely to cauſe obſtructions even to the moſt healthy, if they lead a ſedentary life; but it has leſs of this quality than any of the other vegetable ſubſtances which are eſteemed wholeſome food; and it is much eaſier taken off by a gentle fermentation, to which it is peculiarly adapted, and far from injuring the dough; it only takes away that viſcous quality, by clearing it of that fixed air which combines its parts together, rendering it more light and much eaſier of digeſtion, and conſequently more wholeſome. This fermentation makes it much better inſtead of ſpoiling it; and it is not more reaſonable to ſuppoſe, that bread ſhould be ſpoiled by this method of fermentation, than wine is ſpoiled, becauſe it is produced from the ſame kind of fermentation.

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* Spur-corn.

What food is ſo proper, ſo refreſhing as bread? Nothing cloys ſo little. If the fermentation be too great, the bread may be a little acid; this is a defect; but even this defect does not make it leſs wholeſome for many conſtitutions: and M. Linguet is miſtaken, in admitting, that of all digeſtable ſubſtances, there is none more hurtful, 'more hard 'of digeſtion, or more heavy in the ſtomach;' he alſo adds, that 'it occaſions the blood to be thick 'and corrupt; and one of the moſt celebrated 'aphoriſms in phyſic is, that the indigeſtion pro'duced by it is certain death.' Theſe aſſertions have been too careleſsly advanced on the teſtimony of ſome perſons who have examined the effects of bread very ſuperficially. Of the flour or bread which is produced from grain, there is none of which one may eat a greater quantity, that digeſts more eaſily, or which corrupts the blood ſo little. Thick blood is the effect of too ſtrong an action of the veſſels, or too quick a circulation; bread does not quicken it too much, nor does it cauſe that ſlow circulation, like other farinous ſubſtances. A light decoction of bread is a very wholeſome nouriſhment and beverage in agues, putrid fevers, and in the cholera morbus.

The aphoriſm which M. Linguet quotes above is an error of the leaſt enlightened times. I dare affirm, that no perſon ever died of indigeſtion from bread; and in oppoſition to this quotation, I ſhall bring an authority more reſpectable than the ſchool of Salernum. You know, Sir, that Hippocrates remarks, that in a ſcarce ſeaſon of wheat, when they were obliged to ſubſiſt on other vegetables, many paralytic complaints appeared, the natural conſequence of bad food and relaxed fibres.

We may further add, that if the ſuperiority of wheat, above all other eatable grain, had not been demonſtrated by ſo many indubitable facts, it would be proved by the ſeveral accurate trials of M. M. Beccari, Kerſel, Meyer, Roell, and Macker, upon flour; that glutinous or animalized ſubſtance abſolutely unknown till within theſe forty years, which is the fourth part of wheat flour, and of which the flour of other grains have ſcarcely any, ſeems deſigned to render this flour more eaſy of digeſtion, and more nutritive, ſince it loſes leſs in being reduced to a proper ſtate for food, and is more ſtimulant. I ſay this glutinous quality aſcertains the ſuperiority of wheat above all other grain; and it ſeems to me, after many obſervations, and on a compariſon between the inhabitants of thoſe countries which have no wheat, and thoſe where it is the principal food, one may venture to affirm, that it is the nouriſhment, of all others, moſt favourable to the mental faculties.

Thoſe whoſe food is maize, potatoes, or even millet, may grow to a large ſize, or be tall; but I much doubt, Sir, if any one, who lived wholly on them, could ever write the Political Annals of the Sixteenth Century, the pleadings of Monſ. Le Duc D'Aiguillon, and the defence of Monſ. Le Comte De Morangier, &c.

If the inhabitants of Europe are, in all reſpects, ſuperior to other parts of the world, it is owing, perhaps, to their great uſe of wheat. If many nations eat leſs of it than others, and yet appear equal in all reſpects, it is that the nature of their other food and drink requires leſs: thoſe who drink beer make uſe of ſoaked bread; or, indeed, it may be deemed a kind of bread diſſolved, which has the double effect of bread, both as to nouriſhment, and as an antiſeptic, preventing the putrid effects of other food. There are others who eat it under a variety of forms, and, if they eat leſs bread, may conſume an equal quantity of flour; and again, there are others who do not eat enough, and that is, perhaps, the occaſion of thoſe diſeaſes which carry off ſuch numbers. Thoſe diſtricts which conſiſt chiefly of dairy farms have leſs need of bread than others; and for the ſame reaſon, the inhabitants of the mountainous countries ſhould eat more.

But Monſ. Linguet ſhould take notice, that it is becauſe milk is of much the ſame nature as bread, that it yields a nouriſhment partly vegetable and partly animalized; and that it alſo contains a ſubſtance ſimilar to that valuable glutinous quality of wheat. And M. Macker, whoſe deciſions are a law in chymiſtry, has diſcovered, that the curd of milk, joined to thoſe particles which contain only the ſtarch, would be one of the beſt means to render it capable of making good bread. What ſtill proves farther the ſuperiority of wheat above all other farinaceous grain, it is neceſſary to make the ſtrongeſt beer; and nothing can be found as a ſubſtitute for it. Is not this union of an animalized and vegetable ſubſtance, in the ſame grain, a certain indication that it is deſigned as the principal food of a being, who, like man, is deſtined to ſubſiſt on animal and vegetable ſubſtances?

If there are men very lean, withered and decrepid, in countries where they ſubſiſt on bread, this is not, Sir, becauſe they eat only bread, ſince it is known that the Roman legions lived upon it, and were very healthy; but it is becauſe they do not eat enough of it, or that it is bad; either it does not afford nouriſhment ſufficient, or the quality is bad, and they are alſo worn out with hard labour.

If there is a ſmall diſtrict in the Pyrenean mountains, where every houſe contains a patriarch, and every garden receives a happy man who ſubſiſts on maize, which does not grow on many other mountains, it is becauſe they are entirely ignorant of our manners, and are wiſe enough not to have any ambition of knowing them; but this way of thinking would render them equally happy with flour-milk as with their Turkiſh corn. In theſe countries, the clearneſs of the air prevents the inconveniences which are occaſioned by this kind of food in other places.

It is happy for the inhabitants of thoſe countries where corn will not grow, that they are able to ſubſiſt without bread, and where nothing is produced to give in exchange for thoſe things they want; and it is alſo a great happineſs, that in countries which produce nothing, but where the induſtry of the people brings in a great deal of money, they can, with that money, import from foreign parts, and ſometimes from very diſtant places, a ſpecies of proviſion which will bear very long voyages, and may be preſerved many years unhurt; but moſt other grains can be kept only a little time, and will not bear exportation ſo well.

In 1713, wheat ſold here at ſix livres the French quarter, which came to at leaſt twenty-eight livres the quintal; and the quantity that each perſon was allowed to purchaſe, was regulated; and about eight years ago it was nearly that price, and a like ſcarcity may be again experienced.

There would have been a famine in Switzerland, if they had not imported grain, not only from Piedmont and Milan, but alſo from Sicily and Barbary.

Maize, which is not reaped till October, is not eatable immediately, unleſs very nicely dried (and this drying requires much more care than wheat;) it alſo ſpoils very ſoon; and, however well it may be got in, even if it does not appear to be altered, it acquires from the month of June, a conſiderable degree of acidity, which renders it leſs agreeable, and leſs wholeſome; beſides, the property which it has, of ſo quickly fattening animals fed with it, proves that it is not ſo wholeſome a food as wheat, which, without fattening them ſo ſoon, gives them a firmneſs and flavour; it appears alſo by this, that it does not give them a firmneſs of fibres; and may not this be one of the cauſes, ſo well eſtabliſhed, that many people in America, who live only on maize, are ſo inferior in phyſics and morality to the European nations?

Monſ. Linguet has not had an opportunity of taſting preparations of buck-wheat or millet; if he had taſted them, he would not have adviſed any perſon to ſubſtitute them in the place of thoſe prepared from wheat: And even if theſe plants could furniſh ſo agreeable and ſo wholeſome a food, yet they would be liable to many real objections. All the millets impoveriſh land to ſuch a degree, that if they are often ſown in the ſame land, it will produce nothing elſe for a long time: it is for this reaſon, that the culture, very ſlightly recommended ſome years ago, is now abſolutely decried. Buck-wheat, the produce of which is ſometimes very conſiderable, when it grows, has not the ſame inconvenience; but it is the moſt tender of all plants, and the moſt uncertain; the ſlighteſt intemperance of the ſeaſon reduces its produce to nothing; and one may venture to affirm, that thoſe countries in Europe, which depend on buck-wheat for their ſubſiſtence, run a riſk of being frequently threatened with a famine.*

Before I ſaw M. Linguet's Treatiſe, I did not know that there were no poor people in Ireland and Scotland; but I know very well, that if the police does not hinder it, there is a great number in all fertile countries, becauſe the indigent, from the poorer diſtricts, will go thither.

I do not believe, and permit me to tell you ſo, Sir, that one ſack† of wheat takes more from the land than is ſufficient to bring up and ſubſiſt a poor perſon; but I know that a ſack of wheat would be ſufficient for him to live upon at leaſt four months; and I have ſeen, that where there is one ear of corn to be gleaned, ten poor people who are in want of it, will go from afar to gather it. And if we admit what Monſ. Linguet advances, that there are poor perſons who are ſhamefully obliged to beg their bread on the very furrows which produce it in plenty; in comparing this propoſition with the little quantity of corn

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* But little is ſown in this country, where it is ſeldom uſed but for fattening poultry; and they ſow only the buck-wheat of Britanny. As the months of July, Auguſt, and September, when it is on the ground, are often very dry, perhaps it would be better to ſow the large buck-wheat, which grows better in dry ſeaſons.

† What is called in this country a ſack of wheat, ought to weigh two hundred pounds: And an ingenious phyſician at Lyons, one of my

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my friends, has made the following experiments with great preciſion: 301lb. of ground wheat, without ſeparating the bran, yielded 297lb. of flour, which produced 448lb. of paſte, and 430lb. of good bread. A ſack which weighs 200lb. will yield 286 lb. of bread; and if 20lb. be allowed for the bran being taken away, there will remain 266 lb. of very good bread, of which 2 lb. per day will certainly be a very ſufficient quantity for one perſon, who, with theſe 266 lb. of bread, may ſubſiſt 133 days, or at leaſt four months: Allowing a tenth part for the expence of grinding and baking, it appears that, according to this calculation, a man in an uninhabited iſland, who poſſeſſed but three-fourths of an arpent of land, of which he could eaſily dig up half an arpent, to ſow wheat, and who could, in the remaining part, cultivate ſome ſorts of pulſe, (of which I ſhall treat hereafter) above all cabbages, would reap above 800 lb. of wheat; he would then have 600 lb. to ſubſiſt him; and although he ſhould have only 200 lb. to ſell, yet this would furniſh him with what ſalt and butter he would have occaſion for; and the ſtraw would procure ſufficient manure; and I much doubt, if this ſpot would, employed in any other manner, afford him ſo certain or ſo wholeſome a ſubſiſtence.

which is ſufficient to ſubſiſt a perſon, it is impoſſible to ſuppoſe, that he is in danger of being ſtarved, becauſe his country produces a plenty of corn.

I hope what I have ſaid will undeceive Monſ. Linguet, and alter the wrong opinions which ſome miſinformed phyſicians have given him concerning the bad qualities of bread, which is certainly the moſt wholeſome of all foods; and that in re-examining all the circumſtances of thoſe countries which produce it, he will find that theſe are rich or poor in proportion to the goodneſs of the ſoil, and that a plenty of wholeſome food can never be the cauſe of poverty.

If monopoly,* bad regulation, or bad management in the corn trade, bad cultivation, or fraudulent practices, have cauſed Monſ. Linguet to be diſguſted, it is not the fault of the corn itſelf, in which trade fewer would be employed, and on which ſtill fewer ſpeculations would be made, if it were of leſs value, or not of real importance. A value for which, could any thing elſe be ſubſtituted by the individual that cultivates only for his own ſupport, it never could be by the miniſter who has fleets and armies to provide for, which could not otherwiſe be ſupplied, and alſo magazines to furniſh in caſe of a ſcarcity, or unfruitful years; but magazines cannot be formed of proviſions which take up a great deal of room, and which muſt be often changed. It would be very dangerous to truſt to any of thoſe grains for a ſubſiſtence, which are ſubject to more accidents than wheat, and of which even the harveſt may totally fail, and whereof one cannot lay up a ſtore to ſerve in caſes of neceſſity; this would be expoſing us to very frequent famines; and certainly that is a very convenient proviſion, of which the great plenty of ſome years will more than compenſate for thoſe of ſcarcity. Beſides, bread has the great advantage, when well made and baked, of keeping a long time, of bearing exportation, of being always ready without any freſh baking; this is alſo a very valuable property, and perhaps is a property peculiar to wheaten bread, ſince other compoſitions with paſte, unfermented, will not keep near ſo long.

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* Monopolies will be carried on in every country, where covetous wretches are found, who are not afraid to attempt it. I have read in the public prints, that a monopoly of hay in one part of the Eccleſiaſtical Territories, had reduced them to great difficulties in providing for their horſes. A monopoly of potatoes, maize, or buck-wheat, might be much eaſier made than of hay, and money will always induce the greateſt number of peaſants to ſell that in the morning which ought to ſubſiſt them at noon.

I ſhould ſtill have further remarks to make on other ſubjects of this Treatiſe, but I do not like to write ſo long in contradiction to this author. I ſhall therefore conclude, with pleaſure, by ſpeaking of a ſubject on which our ſentiments are nearly the ſame, and that is POTATOES. I am perſuaded, and I have mentioned it in a work nearly ready for publication, that there are few kinds of food ſo wholeſome: and there are none of the farinaceous kind unfermented, of which one may eat ſo much. I think them far preferable to maize, buck-wheat, millet, or even rice; and one may eat almoſt as much of potatoes as of bread, without being ſurfeited; they require no preparation; as ſoon as they are dug up, one may boil and eat them; and it is certain that Europe has more reaſon to bleſs the diſcovery of them, than of all the fruits of both the Indies;* therefore the culture of Potatoes cannot be too much encouraged, nor can I ſay too much to recommend the uſe of them; yet there are ſome obſervations to be made, by which we ſhall find, that the preference muſt always be given in favour of wheat.

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* We owe the diſcovery of the *Solanum Tuberoſum*, which is different from the *Convolvulus caule viride repente*, to Admiral Drake, who diſcovered them in his firſt voyage in 1578, in the iſlands to the weſtward of the Streights of Magellan, and brought them home with him; but for near a Century, they were only cultivated in Ireland; and it is not more than fifty years that they have been cultivated in this country, and but twenty that they have been very common. They did not make that rapid progreſs in England which might have been expected, although in 1671, it was publiſhed in the Philoſophical Tranſactions, No. 90, that they had been of the greateſt utility in Ireland, in a dearth which they had ſuffered the preceding year.

Potatoes are much more bulky than wheat; that is to ſay, there is leſs weight and leſs nouriſhment contained in the ſame ſpace; for this reaſon then, as alſo from their being of a moiſt nature, they do not bear long carriage ſo well, nor are they ſo fit for exportation; and yet they muſt be exported, if there are countries where they are neceſſary, and do not yet grow. It is true, they will thrive in very poor lands, and indeed, this might naturally be preſumed from their native ſoil; but they will not grow well in rich land. There is a great difference between thoſe potatoes which grow on our mountains, and thoſe which are produced in the valleys: thoſe in wet lands are bad, and have an acrid diſagreeable taſte, which might render a long uſe of them improper. A ſecond reaſon is, that in dry years, their produce is very ſmall. Laſt year, for example, they had not one third of the ordinary crops; and if this were to happen frequently, there would be no reſource, for thoſe of the preceding years cannot be made uſe of, becauſe they will not keep more than a year; except much greater precaution and care be taken of them, than the farmer can attend to, they grow and ſpoil. The independent gentleman, who is fond of them, may preſerve ſome with care till he can dig freſh ones, which he has cauſed to be planted very early; but I believe the poor cottager muſt be without them, at leaſt three months, and this is a long time. A third reaſon is, that they are very ſoon hurt by the froſt; and when they are frozen, they are good for nothing; and the peaſant is ſeldom in a ſituation to be ſure of preſerving them in a ſevere winter; they were almoſt every where ſpoiled in thoſe three days of hard froſt in January 1776, which, however, did not exceed ten degrees: by this it appears, that potatoes are liable to more inconveniences than wheat; and it muſt be alſo remarked, that they require more care.* It has then been ſufficiently demonſtrated, that wheat has greatly the advantage even of potatoes; which, however, as Monſ. Linguet juſtly remarks, ſhould be eaten in their natural ſtate, rather than in bread; but I would wiſh to do all poſſible juſtice to M. Parmentier, who has taken great pains to recommend them, and to perfect the art of baking them in bread: in this reſpect, we may be more obliged to him than we are at preſent ſenſible of, and he merits our moſt grateful acknowledgements; and I think he alſo deſerves much praiſe for the abilities which he has exerted, and the perſeverance he has ſhewn, in diſcovering a method of making very fine flour, and very good bread, from potatoes. I think it would be wrong if he had adviſed the peaſant not to eat them in a natural ſtate, but only in bread; but this, ſurely, is not his intention; every thing ſhews, that he only meant to render them more uſeful; and when an author publiſhes a work for the public welfare, it would be hard to ſubject it to ſevere cenſure, even if the ſucceſs of it did not anſwer his expectation; which, however, is not the caſe of M. Parmentier. Employed in examining all the farinaceous ſubſtances, of which he well knew the qualities and uſes, Monſ. Parmentier has carried his experiments as far as he could, and has made a diſcovery, which is not only perfectly ſafe, but alſo renders potatoes very uſeful, ſince it does not encourage either a monopoly, or laying them up in ſtore-houſes, which might occaſion a ſcarcity; but is a mode of making them more generally uſeful; for, if in a great plenty of potatoes, the labourer ſhould be ſatiated with them, or if the ſervants complain that they have nothing elſe to eat, in this caſe, the making them into bread will give that pleaſing variety which every one likes; and, as it is very difficult to preſerve potatoes from one ſeaſon to another, the flour prepared in the depth of winter, with one part of good freſh potatoes, would be a very uſeful reſource when they cannot be had in their natural ſtate.

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* If thoſe who have not cultivated them wiſh to be convinced of this, they ſhould read what is ſaid of them in the *Socrate Ruſtique*, where their utility is well diſplayed, and where the culture of them by *Kliock* is ſo exactly and clearly deſcribed, which produced him a very great crop; but however, not ſo large an increaſe as they are capable of.

If the idea of making bread from potatoes were as hurtful as Monſ. Linguet affirms, it is not the fault of Monſ. Parmentier: it has been tried many years. Monſ. Muſtel and Monſ. Engel, both good citizens, were employed to accompliſh the wiſhes of the peaſants in this reſpect; but their experiments did not completely anſwer.

Monſ. Parmentier has diſcovered that method which was eagerly ſought for in vain; and would greatly benefit thoſe countries where they are obliged to uſe millet, buck-wheat, and maize, if he could alſo find a method to take off their viſcous quality.

To render the common food of any country more ſalubrious, is adding to the health, ſtrength, and longevity, of each individual, and has a greater title to the Civic Crown than ſaving the life of a ſingle individual; and I heartily congratulate Monſ. François de Neuchateau, that amiable friend of Monſ. Linguet, in whom the moſt extenſive knowledge and poetic talents are united with the wiſdom of philoſophy: I heartily congratulate him, I ſay, in having done juſtice to Monſ. Parmentier, and in having celebrated, in ſome very fine verſes,* the motive of his works, and the obligations and gratitude due to him. The Authors of the *Journal de Medicine* have alſo been duly ſenſible of the utility of this diſcovery; but they have taken care, at the ſame time, to declare, that however good this bread may be, it is inferior to wheaten bread.

Theſe, Sir, are the principal obſervations which I have made on this Treatiſe of Monſ. Linguet, and which I thought would be uſeful to thoſe who might, perhaps, be perſuaded by his authority. Men better acquainted with theſe ſubjects than myſelf, might, perhaps, have diſcuſſed them with more preciſion.

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* Le plaiſir de faire le bien
Eſt le prix de l'homme qui penſe.

I ſhall conclude this letter by remarking, that although the culture of bread-corn may not be detrimental, and although bread is a wholeſome food, yet, nevertheleſs, I am perſuaded, as I have already ſaid, that perhaps (almoſt univerſally) too much land is appropriated to the culture of corn; and this error is very general in this country, where, however, it is decreaſing. I do not mean that leſs ſhould be reaped; on the contrary, I would wiſh to have more plentiful harveſts, becauſe ſometimes we have a ſcarcity; but I believe, to accompliſh that, (as I have already ſaid) much leſs ſhould be ſown; and I am perſuaded, from the beſt treatiſes on œconomics, from the obſervations communicated to me by perſons fully experienced in this matter, and from the ſoundeſt phyſical principles, that in ſowing leſs corn, and putting the remainder of the lands to ſome other culture, there would be as much grain reaped, and alſo many other uſeful productions.

It were much to be wiſhed, that we could return to the principle of the wiſe Mr. Kliock, and attend cloſer to that plain and ſimple ſyſtem of Agriculture,

culture, which an experience of thirty years has fully eſtabliſhed, and which you have deſcribed with ſo much perſpicuity and elegance.

Your Treatiſe has been read with the greateſt pleaſure and eagerneſs; they have praiſed, they have admired, they have been enraptured by your wiſdom, much more worthy of that name than thoſe ſages which were almoſt adored in Greece: But your work has had the lot of all good books; it has wrought but few changes. New practices, ſay they, are plauſible, but they are not certain; and therefore they retain the old. A man, for example, who has thirty arpents of arable-land, and a proportionable quantity of meadow, ſows, one year with another, twenty arpents, ten to wheat and ten to maize, which is the cuſtom in this country: For a trial, I ſhould ſow but ſeven; by this method three arpents in each diviſion might be ſet apart to other uſes: Let him ſow three arpents of the beſt land with lucerne, three with ſaintfoin,* which is perhaps the beſt of forage, becauſe it will grow in bad land; it will laſt twelve years, at leaſt as long as lucerne; it affords better nouriſhment, and for which a little manure, once in three years, is ſufficient.* Now, it is certain, that theſe ten arpents would, one year with another, produce ſufficient to ſubſiſt two horſes and four horned cattle; or, which would be much better, ſeven or eight horned beaſts, of which the profit would be more conſiderable than theſe ſix arpents,† if three were ſown with wheat and three with maize, indifferently cultivated; and this would be a certain profit, becauſe having his lands better manured, and being enabled to give them one or two more ploughings, his crops will certainly be more plentiful, and ſubject to leſs caſualties, becauſe the ſtrength of the productions would guard it againſt accidents, and render it more certain; he would have as much grain; he would be enabled to ſell as much or even more, becauſe his cows and the produce of the other three arpents, which I have not yet mentioned, would furniſh him with food, which, according to Monſ. Linguet's wiſh, would ſerve him inſtead of bread; he would then be richer and live better, and his ſubſtance would be ſtill increaſed alſo from the produce of the other three arpents, of which I would wiſh him to make a kind of kitchen-garden.

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* Saintfoin is what is called in this country Eſparcette, [*Onobrychis.*] We call Saintfoin what is elſewhere called Lucerne, [*Medica.*]

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* I affirm theſe facts from my own obſervations.

† Three horſes cannot conſume annually the firſt mowing of ſix arpents ſown with lucerne and ſaintfoin; and as theſe graſſes furniſh a ſecond crop more plentiful than the firſt, lucerne always a third, and ſometimes a fourth, and ſaintfoin often a third, there would remain from theſe ſecond mowings, and the ſurplus of the firſt, ſufficient to ſubſiſt four horned cattle.

This is the method of the wiſe Kliock, the ſucceſs of which was thought at firſt to be exaggerated; it has, however, not only borne the teſt of thirty years experience, but even increaſed conſiderably; and what proves it to a demonſtration is, that the people of the country followed his example.

Of this garden, a part ſhould be ſown with maize, which would enable him to fatten his pigs and poultry; another part with Alſace radiſhes, either the ſpring ſort, or thoſe which are larger; a good portion with potatoes; the reſt with the yellow carrots, wholeſome pulſe, light and ſavory herbs, which are not too tender, but which require as little care as potatoes and cabbages, which with very little culture will yield more fine plants than will be ſufficient for his conſumption. The overplus and refuſe of his pulſe will furniſh very excellent food for his ſheep and cows.

Carrots are very uſeful for horſes, and the refuſe of the cabbages may be uſed as an excellent manure; and I doubt not but he would live much better, and be much richer, without more labour; and above all, if to his method he would add ſome other corrections and amendments to his Syſtem of Agriculture, viz. In the firſt place, (which has been frequently mentioned already) he ſhould never ſow wheat and rye together; for theſe two grains, though of the ſame kind, do not thrive well in the ſame ſoil, nor require the ſame care in the culture, neither do they ripen at the ſame time, and never grow ſo well together as ſeparate; for when the rye grows well, it almoſt hides the wheat, which, being ſo much ſhaded, neither bloſſoms nor ripens well; therefore, the grain is not ſo large, nor of ſo firm a texture, as when the wheat is ſown by itſelf.

The ſecond is, not to let his graſs ſtand too long before it is mown; *firſt*, becauſe it has been fully proved, that hay is leſs nouriſhing to animals, when it comes to ſeed; and *ſecondly*, becauſe as ſoon as the bloſſom drops, the plant is nouriſhed wholly from the roots, which impoveriſhes the land; and *finally*, I wiſh him to keep a greater number of ſheep; but, inſtead of feeding them in cloſe and hot ſtables, where they frequently die, he ſhould feed them in incloſures near the houſe, or in fields bounded by partitions, ſix or ſeven feet high on the north ſide, and five feet high on the other ſides, without any covering, or, if any, only two feet wide on the north ſide. The moſt exact and conſtant experience, for twenty years, proves, that this is the only method of making them thrive well, and of having fine wool and better flavoured mutton.

Theſe obſervations may be depended on, as having been made with great preciſion by Monſ. D'Auberton, one of the moſt general obſervers of theſe days, a gentleman thoroughly acquainted with the nature of thoſe animals, and very exact in his obſervations, and that in a country farther north, and certainly colder than Lauſanne, and which appears to be about the ſame climate of Zurich and of great part of Switzerland.

This great Phyſician has proved, that ſheep are neither hurt by cold nor by ſnow, nor rain, but that too great heat hurts them more than any thing elſe;—an obſervation which is confirmed by the care they take in Spain to drive them from the plains of Andeluſia to the mountains of Old Caſtile, before the ſummer heat comes on. On the contrary, in this country, they ſeem only to fear their being hurt from cold; ſo they keep them in ſtables and cloſe places; and by this management, very frequently loſe numbers of them.

Thus, Sir, have I written a very long letter; and I ſhall be much flattered, and alſo be much more certain that I am in the right, if you think as I do.

FINIS.